MARINE BIOTOXIN MONITORING PROGRAM

ANNUAL REPORT

2001

Submitted to:

California Department of Fish and Game

By:

California Department of Health Services

Division of Drinking Water and Environmental Management

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ACKNOWLEDGEMENTS

This report was prepared for the California Department of Fish and Game under agreement number PO170005. The California Department of Health Services would like to thank the Department of Fish and Game for their support of the paralytic shellfish poisoning monitoring program.

Shellfish toxicity data is generated on an almost daily basis by the Department of Health Services' Marine Biotoxin Monitoring Program thanks to the continuing efforts of our program participants. Additionally, volunteers are collecting phytoplankton samples on an almost daily basis, providing near real-time observations of the occurrence of toxin producing species. As with all such endeavors, our success in protecting the public is due in large part to the numerous people who contribute their time and effort to collect samples at representative sites along the coast. The monthly listing of our program participants, provided in Appendix B and Appendix D, illustrates the diversity of groups and individuals that contribute to these efforts. The Department of Health Services would like to express its sincere appreciation to our program participants for all of their efforts.

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INTRODUCTION

California has a long history of paralytic shellfish poisoning (PSP), dating back to the time of the coastal Native American tribes. According to Meyer (1928) it was a common procedure for the coastal Pomo tribe to place sentries to watch for luminescence in the waves, having apparently established a link between bioluminescence and mussel poisoning, both of which are caused by dinoflagellates in the phytoplankton. The long-standing concern of California's public health officials for protecting the public from PSP has been warranted, as there have been 542 reported illnesses and 39 deaths attributable to this toxin since 1927 (Price et al., 1991).

In the fall of 1991 another natural toxin was identified along the California coastline. Domoic acid, a neurotoxin of lower potency than the PSP toxins, has become of equal concern because the blooms of diatoms that produce this toxin have been of greater frequency and longer duration than most PSP events over the past 10 years. In addition, domoic acid has had dramatic impacts on marine mammal and seabird populations along the coast, raising the public's awareness of marine biotoxins in general.

Because PSP toxicity represents a serious ongoing public health threat that requires year-round attention, the California Department of Health Services (DHS) has implemented a prevention program comprised of five basic elements: (1) a coastal shellfish monitoring program; (2) monitoring of commercial shellfish product; (3) an annual statewide quarantine on sport-harvested mussels (from May 1 through October 31); (4) mandatory reporting of disease cases; and (5) various public information and education activities. This annual report primarily describes the shellfish sampling element of the program for PSP monitoring during 2001. A brief summary is also provided for domoic acid monitoring, phytoplankton monitoring, and quarantine and health advisory activities.

Paralytic Shellfish Poisoning

PSP is an acute, sometimes fatal form of food poisoning that is associated with the consumption of bivalve molluscs that have fed on the toxin-producing dinoflagellate *Alexandrium catenella* (formerly *Protogonyaulax catenella* and *Gonyaulax catenella*). Eating shellfish that contain PSP toxins leads to an acute disturbance of the nervous system within a few minutes to a few hours. The PSP toxins are sodium channel blockers and thus inhibit neural transmission. Symptoms begin with tingling and numbness of the lips, tongue, and fingertips, followed by disturbed balance, lack of muscular coordination, slurred speech and difficulty in swallowing. In severe poisoning, complete muscular paralysis and death from asphyxiation can occur if breathing is not maintained by artificial means. There is no known antidote to the poison. Symptoms tend to resolve entirely in a day or two under proper medical care. Persons who suspect they or others are experiencing PSP symptoms should immediately seek medical treatment.

The type and severity of symptoms depends on the amount of toxic shellfish consumed as well as the specific toxicity of the shellfish. Price et al. (1991) summarize the range of toxin dose responses as follows: 200 to 500 micrograms (µg) will cause al least minor symptoms, 500 to 2000 µg will cause moderate to severe symptoms, and toxin concentrations greater than 2000 µg will produce serious to lethal effects. It should be noted that exceptions exist and serious health effects have also been documented at much lower concentrations (100 to 400 µg). The federal alert level for PSP toxicity is 80 µg per 100 grams (g) of shellfish tissue, and the detection limit for the PSP bioassay is approximately 40 µg/100 g.

Alexandrium is normally absent or constitutes a minor component of the marine phytoplankton community along the California coast. Under favorable environmental conditions this dinoflagellate may undergo periods of rapid population growth, frequently referred to as a “bloom”. The term “bloom” or “red tide” is misleading with respect to *Alexandrium* and the resultant PSP toxicity in shellfish. Visible blooms of *Alexandrium* are rarely seen along the California coast. Conversely, elevated levels of PSP toxins in shellfish can result from the presence of relatively low numbers of *Alexandrium* in the water.

The source of the dinoflagellates that provide the “seed” for such blooms is in question, but two likely scenarios are possible. First, resting cysts of *Alexandrium* in local sediments can, under favorable conditions, produce vegetative cells that can then reproduce both sexually and asexually, resulting in localized “hot spots” of PSP toxicity in shellfish. Second, this dinoflagellate may be transported in offshore warm water masses that can move onshore under certain environmental conditions. This advection process could potentially result in either a quick spike in PSP toxicity if the number of transported cells is high, or it may simply provide the cells necessary for a bloom to initiate. Regardless of the origins of the toxin-producing dinoflagellates, the general pattern has been for these blooms to be detected first along the open coast, occasionally followed by transport into bays and estuaries. The degree to which coastal phytoplankton blooms intrude into bays and estuaries is likely influenced in part by the orientation of the bay relative to coastal currents and by the extent of tidal mixing and transport that occurs inside the bay.

Domoic Acid

In October of 1991 the presence of another marine biotoxin was confirmed in California’s coastal waters. Domoic acid toxicity, which can result in the condition called amnesic shellfish poisoning (ASP), was identified as the cause of death in a large number of brown pelicans and Brandt’s cormorants in the Santa Cruz area of Monterey Bay. The birds had been feeding on schools of anchovies in the bay, which in turn had been feeding on a bloom of the diatom *Pseudo-nitzschia australis* (formerly *Nitzschia pseudoseriata*).

The only documented domoic acid event prior to 1991 was a serious episode in Prince Edward Island, eastern Canada, in 1987 in which three people died and over 100

people were made ill from the consumption of toxic mussels. Domoic acid is a neuroexcitatory amino acid that causes over stimulation of certain nerves cells in the brain, with potentially permanent or fatal effects. Case studies of the Canadian episode indicated that the most common symptoms were gastrointestinal, followed by neurologic symptoms including headaches, loss of balance and/or dizziness, memory loss, varying degrees of confusion, disorientation, changes in the level of consciousness, and in some cases seizures (Teitelbaum, 1990; Perl et al., 1990).

Based on the rather small number of case histories available the following dose responses can be approximated while recognizing the overlap in ranges and symptoms: 27 to 75 µg/g may result in mild to moderate symptoms (gastrointestinal), 40 to 700 µg/g may result in moderate to severe neurologic symptoms, and domoic acid concentrations greater than 450 µg/g may result in severe neurologic symptoms and/or death.

Phytoplankton

There were no documented human health impacts from the 1991 Monterey Bay domoic acid episode, but the severity of the Canadian outbreak made it clear that continued monitoring for domoic acid would be necessary for public health protection. Because of the cost and time involved in running separate analyses for each toxin, in addition to the prospect that other known toxins may be present along the California coast, DHS began a volunteer-based phytoplankton monitoring program in 1993. The intent of this program was to develop a network of volunteer samplers and field observers that would allow the early detection of potentially toxigenic blooms. Early detection is key to mobilizing and focusing additional sampling and analytical resources for plankton, shellfish, and other species in the affected region. As a result of this volunteer effort DHS has been able to detect and track numerous harmful algal blooms, improving the capabilities for protecting the public health.

2001 SAMPLING EFFORT

Paralytic Shellfish Poisoning

Shellfish samples were collected at 59 different sites along the coast of California in 2001 (Figures 1a and 1b). Several commercial growing areas had multiple sites representing different harvest areas. There were 875 shellfish samples collected statewide during 2001 for PSP toxin assay. The greatest number of samples (380) was collected at sites in Marin County (Table 1), with commercial shellfish aquaculture companies providing approximately 94% of the total samples collected in this county. The majority of these (249) were contributed by Johnson Oyster Company in Drakes Estero, which samples four stations on at least a weekly basis. The large proportion of Marin County sites is a reflection of both the number of commercial growers and the frequency of occurrence of PSP toxicity in this region.

Commercial shellfish growers accounted for 69% of all samples collected in 2001, followed by coastal county health departments (17%; Table 2). Several other program participants, including state and federal agencies, universities, and volunteers, provided valuable assistance by contributing their sampling effort in 2001 (Table 3). As mentioned above, monitoring of the outer coast is a key element in California's marine biotoxin monitoring program because all toxic blooms to date have originated offshore or along the coast. Monitoring coastal shellfish resources can therefore provide an early warning of toxic conditions that may soon impact shellfish in bays and estuaries, which harbor the majority of commercial shellfish growers and recreational clam beds.

The majority of samples collected in 2001 consisted of mussels (70%), followed by cultured pacific oysters (29%; Table 4). There were no other shellfish species sampled for PSP toxin analysis in 2001 with the exception of a single scallop sample submitted by U.C. Santa Barbara's Marine Science Institute. The use of mussels as a primary indicator species for PSP toxins is based on their ability to bioaccumulate these toxins at a faster rate that other bivalve species (Shumway, 1990). The DHS Marine Biotoxin Monitoring Program demonstrated the differential uptake in mussels versus oysters during a major PSP event in 1991 (California Department of Health Services, 1991).

Domoic Acid

There were 82 shellfish samples analyzed for domoic acid during 2001. Samples from 25 different sampling sites representing six counties were targeted for analysis as a result of observations from the volunteer monitoring network of high numbers of *Pseudo-nitzschia spp*. The greatest number of samples (34) was submitted from San Luis Obispo County (Table 1), with commercial shellfish aquaculture providing approximately 85% of the total samples collected in this county.

Phytoplankton

There were 994 phytoplankton samples collected during 2001 representing all coastal counties except Del Norte (Table 5). Samples were collected at 115 different sampling sites throughout these counties by 70 volunteers (Figures 1c and 1d).

2001 RESULTS

Paralytic Shellfish Poisoning

PSP toxicity in 2001 was less widespread and concentrations were lower than observed in past years since 1991, with the exception of 1996 (Figure 2). In general, the onset of PSP toxicity in shellfish was delayed compared to past years. Although low levels of PSP toxins were detected in shellfish by July 1, the alert level of 80 µg was not exceeded until mid-August (Figure 3). It was not until September, however, that peak toxicity occurred. Low levels of these toxins were detected through December in shellfish from the northernmost part of the state. Maps illustrating weekly sampling effort

and relative toxin concentrations for each month are provided in Appendix A.

Measurable concentrations of PSP toxins were found in 169 shellfish samples (17%) from the following coastal counties: Del Norte, Humboldt, Sonoma, Marin, San Mateo, Santa Cruz, San Luis Obispo, and Santa Barbara. PSP toxin concentrations above the alert level of 80 micrograms (mg) per 100 grams of shellfish meat were detected in 19 samples, representing 11 percent of all positive samples, from four California counties: Humboldt, Sonoma, Marin, and Santa Cruz. PSP toxicity was found most frequently, and at the highest concentrations, along the coast of Marin County during 2001. The highest concentration detected was 535 µg in Drakes Bay at a DHS sentinel mussel station. PSP toxin concentrations above the alert level were detected in both mussels and oysters.

The first sample containing a detectable concentration of PSP toxins consisted of mussels from Morro Bay in San Luis Obispo County (July 1). By the second week of July there were detectable levels of PSP toxins inside Drakes Estero in Marin County (July 10). Low toxin levels persisted in Morro Bay and gradually increased in Drakes Estero throughout the month. By the end of July low levels of PSP toxins had been detected in shellfish from five different coastal counties, ranging from Santa Barbara to Del Norte (Table 5).

The distribution of low level PSP toxicity persisted at most of these sites through August. By August 22 sentinel mussels at the U.S. Coast Guard station just inside Humboldt Bay contained 91 µg of toxins, exceeding the alert level of 80 µg. Within one week the level of toxins had decreased to 51 µg at this site.

A significant increase in PSP toxicity was detected in mussels from two sentinel stations in Marin County by mid September. Within one week the toxin levels increased from low levels to 189 µg and 290 µg in mussels from Chimney Rock and Drakes Estero, respectively. These elevated toxin concentrations persisted through September, and similar increases were observed at Salt Point State Park (122 µg) in Sonoma County and at the U.S. Coast Guard sentinel station in Humboldt Bay (112 µg). The highest toxin concentration recorded during this event occurred on September 24 at the Chimney Rock sentinel station (535 µg).

PSP toxicity decreased at most sites throughout October, with two exceptions. Mussels collected from Salt Point State Park on October 31 contained 102 µg of toxins. Because samples were difficult to obtain at this site it is not known if this observation represented a continuation of the event first detected in late September or if it represented a resurgence in toxicity. The low levels of toxicity that had been observed sporadically in mussels from Santa Cruz in northern Monterey Bay increased briefly above the alert level, reaching 81 µg by October 23.

Low levels of PSP toxins persisted in November at several sites from five different counties, ranging from Santa Cruz to Del Norte. Of special note was the persistent detection of mostly low levels of PSP toxins in mussels from two sites in Humboldt Bay

from mid August through the end of December. Although mussels from the U.S. Coast Guard sentinel station just inside Humboldt Bay had briefly increased above the alert level in late August and again in late September, mussels from farther inside the bay at the Indian Island sentinel station did not increase above 55 µg.

Domoic Acid

The DHS Food and Drug Laboratory began analyzing shellfish samples for domoic acid in response to the phytoplankton observations and samples from the DHS volunteer monitoring network, which detected a rapid increase in *Pseudo-nitzschia spp.* in June. Despite the persistence of this bloom through the summer, with apparent fluctuations in relative abundance from month to month, domoic acid was not detected in shellfish until the end of September. Mussels from Morro Bay (San Luis Obispo County) increased to 7.3 parts per million (ppm) on September 24. By October 15 the concentration of domoic acid had increased to 16 ppm in mussels at this site but quickly returned to a nondetectable level. The highest concentration of domoic acid observed in oysters from Morro Bay was 4.2 ppm (October 15).

2002 Preview

This brief summary of the domoic acid monitoring data for 2002 is provided due to the record levels of toxin detected in various shellfish species through April 2002. This series of events was the largest domoic acid episode documented in California in terms of both the geographical extent and the toxin concentrations detected. There were no human health effects associated with this event but there were hundreds of marine mammals affected. DHS and the California Department of Fish and Game issued a joint press release on May 1 to provide information to the public on this ongoing event and to reiterate the public health concerns associated with consumption of seafood containing domoic acid. A complete review of this event will be provided in the 2002 annual report.

In February there were reports from researchers at the University of California, Santa Cruz, of a *Pseudo-nitzschia australis* bloom in the Santa Cruz region of Monterey Bay. These observations prompted the analysis of shellfish samples from this region. There was no toxin detected in mussels from the Santa Cruz Pier on February 2, but by February 21 the level of domoic acid had increased to 120 ppm. Toxin levels in mussels remained above the alert level but steadily declined to nondetectable levels by the end of March.

Subsequent blooms were sequentially reported by the volunteer field observers from San Luis Obispo, Santa Barbara, and Los Angeles counties. The first detectable levels of domoic acid in Morro Bay (San Luis Obispo County) occurred on April 1 (56 ppm) and reached a peak concentration of 113 ppm by April 8. The levels of toxin decreased through the month and were nondetectable by May 1. As domoic acid concentrations in mussels from San Luis Obispo declined, concentrations of this toxin were increasing in shellfish from sites in Santa Barbara County. The first positive result was obtained from Goleta Pier (Santa Barbara County) on April 3 (3.2 ppm) and increased through the

month. Peak domoic acid concentrations were detected on May 4 (380 ppm) in mussels from an offshore oil platform collected by researchers from the University of California, Santa Barbara. The concentration of domoic acid steadily declined at sites in Santa Barbara through May and was not detected after June 1. The highest concentration of domoic acid detected in Ventura County occurred in a mussel sample collected on April 22 (55 ppm). In a pattern similar to that for Santa Barbara, toxin levels in Ventura shellfish steadily declined through May and were undetectable by May 29.

Phytoplankton observations and toxicity data from the Los Angeles region were more complex that other areas. Following the event in Monterey Bay, the first report of another *Pseudo-nitzschia* bloom came from program participants at the Catalina Island Marine Institute and aboard the Catalina Tall Ships Expedition vessel Tole Mour. Both groups reported a bloom of this toxin-producing diatom on the weekend of March 30, coinciding with the first report of a stranded dolphin on a Los Angeles beach. Detectable levels of domoic acid in shellfish from the nearshore area of Los Angeles did not occur until May 1 (28 ppm). The levels of toxin in shellfish from Los Angeles County peaked by May 19 (170 ppm) in samples submitted by the Los Angeles County Health Department. The concentration of domoic acid in mussels from this region decreased steadily and was nondetectable by May 30.

Phytoplankton

Of the 994 phytoplankton samples collected in 2001, 507 (51%) contained toxigenic species. Toxin-producing phytoplankton were observed at 97 different sampling stations representing all coastal counties that were sampled. The following is a summary of phytoplankton observations during 2001 (see Appendix C for maps illustrating sampling effort and relative abundances for toxin-producing phytoplankton for each month).

Alexandrium

The relative abundance of *Alexandrium* was very low through June, with a slight increase in July. By August the numbers of this dinoflagellate began increasing in distribution and relative abundance with associated increases in PSP toxin concentrations. Numbers of this dinoflagellate continued to increase through September and were associated with peak PSP toxin concentrations for the year. The highest relative abundance of *Alexandrium* in Marin County was observed by the second week of September at the DHS sentinel station in Drakes Bay, coinciding with a rapid increase in the concentration of PSP toxins in mussels at this site.

Pseudo-nitzschia spp.

Several increases in the relative abundance of *Pseudo-nitzschia spp*. occurred throughout 2001. Early but short-lived increases in this diatom were observed at the end of April at sites in several southern California counties. During the first week of June there was another rapid increase in the relative abundance of this diatom at several sites along the San Luis Obispo coast that persisted until the end of the month. By the

second week of June a similar rapid but brief increase in *Pseudo-nitzschia spp*. was observed at several sites in Santa Cruz and Monterey counties inside Monterey Bay. A similar brief increase was observed in late June along the Santa Barbara coast.

Increases in *Pseudo-nitzschia* occurred again in August at sites from several central California counties, followed by a more sustained bloom throughout September and into October that resulted in detectable concentrations of domoic acid in shellfish.

2001 PSP QUARANTINES AND RELATED HEALTH ADVISORIES

The only quarantine action taken in 2001 for PSP was the implementation of the annual quarantine, which normally runs from May 1 through October 31. The annual quarantine was rescinded on schedule at midnight on October 31.

On October 5, DHS issued a Health Advisory on consumption of sardines caught by recreational fishermen throughout Monterey Bay due to elevated levels of domoic acid, another neurotoxin that was found to occur along the California coast. In addition, DHS also issued a Health Advisory on October 22 for shellfish and other seafood along the Santa Barbara coast due to elevated levels of domoic acid.

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TABLES 1 – 6

Table 1. Total number of shellfish samples collected per coastal county in 2001 for PSP assay.

COUNTY	# SAMPLES
Del Norte	16
Humboldt	84
Mendocino	0
Sonoma	22
Marin	380
San Francisco	16
San Mateo	16
Santa Cruz	38
Monterey	0
San Luis Obispo	124
Santa Barbara	61
Ventura	5
Los Angeles	17
Orange	39
San Diego	57
TOTAL	**875**

Table 2. Number of shellfish samples collected by program participants, per coastal county, in 2001 for PSP assay.

COUNTY (North to South)	COMMERCIAL GROWERS	COUNTY AGENCIES	STATE AGENCIES	FEDERAL AGENCIES	OTHER PARTICIPANTS	TOTAL
Del Norte	--	16	--	--	--	16
Humboldt	66	18	--	--	--	84
Mendocino	--	--	--	--	--	0
Sonoma	--	18	4	--	--	22
Marin	356	--	24	--	--	380
San Francisco	--	16	--	--	--	16
San Mateo	--	16	--	--	--	16
Santa Cruz	--	18	20	--	--	38
Monterey	--	--	--	--	--	0
San Luis Obispo	112	10	2	--	--	124
Santa Barbara	--	--	58	3	--	61
Ventura	--	5	--	--	--	5
Los Angeles	--	17	--	--	--	17
Orange	28	11	--	--	--	39
San Diego	44	--	--	--	13	57
TOTAL =	**606**	**145**	**108**	**3**	**13**	**875**

Table 3. Program participants by county that submitted shellfish samples in 2001 for PSP assay.

COUNTY	AGENCY
Del Norte	Del Norte County Health Department
Humboldt	Humboldt County Environmental Health Department
	Coast Seafoods Company
Mendocino	
Sonoma	Sonoma County Public Health Department
	California Department of Parks and Recreation
Marin	DHS Marine Biotoxin Monitoring Program
	Cove Mussel Company
	Hog Island Oyster Company
	Johnson Oyster Company
	Marin Oyster Company
	Point Reyes Oyster Company
San Francisco	San Francisco County Health Department
San Mateo	San Mateo County Environmental Health Department
Santa Cruz	Santa Cruz County Environmental Health Department
	University of California Santa Cruz
Monterey	
San Luis Obispo	Williams Shellfish Company
	San Luis Obispo County Environmental Health Department
	DHS Marine Biotoxin Monitoring Program
Santa Barbara	University of California Santa Barbara Marine Science Institute
	California Department of Parks and Recreation
	Vandenberg Air Force Base, Environmental Health Services
Ventura	Ventura County Environmental Health Department
Los Angeles	Los Angeles County Health Department
Orange	Orange County Health Care Agency
	Ecomar, Inc.
San Diego	Carlsbad Aquafarm, Inc.
	DHS Volunteer

Table 4. Number and species of samples collected in 2001 for PSP assay.

SAMPLE TYPE	# SAMPLES
Bay Mussels[1]:	
Sentinel	142
Wild	30
Cultured	131
Total Bay Mussels	**303**
Sea Mussels[2]:	
Sentinel	110
Wild	171
Total Sea Mussels	**281**
Mixed Bay and Sea Mussels	30
Total Mussels	**614**
Pacific Oysters[3]	
Cultured	**258**
Rock Scallops[4]	**2**
Other[5]	**1**
TOTAL	**875**

[1] *Mytilus edulis* or *M. galloprovincialis*
[2] *Mytilus californianus*
[3] *Crassostrea gigas*
[4] One sample, separated into two samples (adductor muscles and viscera) for separate analysis
[5] Jack Smelt

Table 5. Total number of phytoplankton samples collected per coastal county in 2001.

COUNTY	# SAMPLES
Del Norte	0
Humboldt	74
Mendocino	27
Sonoma	26
Marin	327
Alameda	8
San Francisco	40
San Mateo	14
Santa Cruz	46
Monterey	17
San Luis Obispo	105
Santa Barbara	88
Ventura	17
Los Angeles	87
Orange	45
San Diego	73
TOTAL	**994**

Table 6. Date and location of shellfish samples containing detectable levels of PSP toxins during 2001.

DATE	COUNTY	SAMPLE TYPE	SAMPLE SITE	PSP TOXINS (UG/100 G)
JULY				
07/01/01	San Luis Obispo	Bay Mussel, cultured	Morro Bay	42
07/09/01	San Luis Obispo	Bay Mussel, cultured	Morro Bay	43
07/10/01	Marin	Bay Mussel, Sentinel	Drakes Estero, Bed #12	40
07/16/01	San Luis Obispo	Bay Mussel, cultured	Morro Bay	48
07/22/01	Del Norte	Sea Mussel, wild	Crescent City, Endert's Beach	38
07/24/01	Marin	Bay Mussel, Sentinel	Drakes Estero, Bed #12	42
07/24/01	Marin	Bay Mussel, Sentinel	Drakes Estero, Channel Buoy	45
07/24/01	Santa Barbara	Sea Mussel, wild	Santa Barbara, VAFB Boat Dock	50
07/25/01	San Luis Obispo	Bay Mussel, cultured	Morro Bay	43
07/26/01	Humboldt	Sea Mussel, Sentinel	Humboldt Bay, Indian Is. Ch.	41
07/26/01	Marin	Sea Mussel, Sentinel	Drakes Bay, Chimney Rock LBS	47
07/26/01	Marin	Pacific Oyster, cultured	Drakes Estero, Bed #12	42
07/26/01	Marin	Bay Mussel, Sentinel	Drakes Estero, Bed #12	49
07/26/01	Marin	Pacific Oyster, cultured	Drakes Estero, Bed #38	40
07/27/01	Marin	Bay Mussel, Sentinel	Drakes Estero, Channel Buoy	76
07/30/01	Humboldt	Sea Mussel, Sentinel	Humboldt Bay, USCG Station	45
07/31/01	Marin	Pacific Oyster, cultured	Drakes Estero, Bed #12	51
07/31/01	Marin	Bay Mussel, Sentinel	Drakes Estero, Channel Buoy	63
AUGUST				
08/01/01	Marin	Bay Mussel, Sentinel	Drakes Estero, Channel Buoy	38
08/02/01	Marin	Sea Mussel, Sentinel	Drakes Bay, Chimney Rock LBS	47
08/02/01	Marin	Bay Mussel, Sentinel	Drakes Estero, Bed #12	47
08/02/01	Marin	Bay Mussel, Sentinel	Drakes Estero, Channel Buoy	54
08/03/01	Del Norte	Sea Mussel, wild	Point St. George	73
08/07/01	Marin	Bay Mussel, Sentinel	Drakes Estero, Bed #12	41
08/09/01	Marin	Sea Mussel, Sentinel	Drakes Bay, Chimney Rock LBS	40
08/09/01	Marin	Bay Mussel, Sentinel	Drakes Estero, Bed #12	41
08/13/01	Marin	Sea Mussel, Sentinel	Drakes Bay, Chimney Rock LBS	61

08/13/01	Santa Cruz	Sea Mussel, wild	Santa Cruz Pier	40
08/14/01	Humboldt	Sea Mussel, Sentinel	Humboldt Bay, Indian Is. Ch.	44
08/14/01	Humboldt	Bay Mussel, Sentinel	Humboldt Bay, USCG Station	39
08/14/01	Marin	Bay Mussel, Sentinel	Drakes Estero, Bed #12	46
08/14/01	Marin	Bay Mussel, Sentinel	Drakes Estero, Channel Buoy	52
08/16/01	Marin	Bay Mussel, Sentinel	Drakes Estero, Bed #12	72
08/16/01	Marin	Bay Mussel, Sentinel	Drakes Estero, Channel Buoy	44
08/20/01	Del Norte	Sea Mussel, wild	Point St. George	51
08/20/01	San Luis Obispo	Bay Mussel, cultured	Morro Bay	42
08/21/01	Humboldt	Sea Mussel, Sentinel	Humboldt Bay, Indian Is. Ch.	45
08/21/01	Marin	Bay Mussel, Sentinel	Drakes Estero, Bed #12	40
08/21/01	Marin	Bay Mussel, Sentinel	Drakes Estero, Channel Buoy	42
08/22/01	Humboldt	Sea Mussel, wild	Humboldt Bay, USCG Station	**91**
08/22/01	San Luis Obispo	Sea Mussel, wild	Moonstone Beach, Cambria	40
08/23/01	Marin	Bay Mussel, Sentinel	Drakes Estero, Channel Buoy	41
08/26/01	San Luis Obispo	Bay Mussel, cultured	Morro Bay	46
08/27/01	Humboldt	Sea Mussel, Sentinel	Humboldt Bay, Indian Is. Ch.	45
08/28/01	Humboldt	Sea Mussel, Sentinel	Humboldt Bay, Indian Is. Ch.	55
08/28/01	Marin	Bay Mussel, Sentinel	Drakes Estero, Channel Buoy	39
08/29/01	Humboldt	Bay Mussel, Sentinel	Humboldt Bay, USCG Station	51
SEPTEMBER				
09/03/01	Del Norte	Sea Mussel, wild	Point St. George	41
09/03/01	San Luis Obispo	Bay Mussel, cultured	Morro Bay	44
09/04/01	Humboldt	Sea Mussel, Sentinel	Humboldt Bay, Indian Is. Ch.	53
09/04/01	Humboldt	Sea Mussel, Sentinel	Humboldt Bay, USCG Station	61
09/04/01	Marin	Bay Mussel, Sentinel	Drakes Estero, Bed #12	56
09/04/01	Marin	Bay Mussel, Sentinel	Drakes Estero, Channel Buoy	44
09/06/01	Marin	Sea Mussel, Sentinel	Drakes Bay, Chimney Rock LBS	40
09/10/01	Santa Cruz	Sea Mussel, wild	Santa Cruz Pier	42
09/10/01	San Luis Obispo	Bay Mussel, cultured	Morro Bay	44
09/11/01	Humboldt	Sea Mussel, Sentinel	Humboldt Bay, Indian Is. Ch.	44
09/11/01	Marin	Bay Mussel, Sentinel	Drakes Estero, Bed #12	42
09/11/01	Marin	Bay Mussel, Sentinel	Drakes Estero, Channel Buoy	**189**

09/12/01	Marin	Sea Mussel, Sentinel	Drakes Bay, Chimney Rock LBS	**290**
09/13/01	Marin	Pacific Oyster, cultured	Drakes Estero, Bed #12	47
09/13/01	Marin	Bay Mussel, Sentinel	Drakes Estero, Bed #12	**121**
09/13/01	Marin	Pacific Oyster, cultured	Drakes Estero, Bed #9	40
09/13/01	Marin	Bay Mussel, Sentinel	Drakes Estero, Channel Buoy	43
09/16/01	San Luis Obispo	Bay Mussel, cultured	Morro Bay	41
09/17/01	Del Norte	Sea Mussel, wild	Point St. George	48
09/17/01	Marin	Sea Mussel, Sentinel	Drakes Bay, Chimney Rock LBS	**144**
09/17/01	Marin	Bay Mussel, Sentinel	Drakes Estero, Bed #12	65
09/18/01	Humboldt	Sea Mussel, Sentinel	Humboldt Bay, Indian Is. Ch.	49
09/18/01	Marin	Pacific Oyster, cultured	Tomales Bay, Lease #M430-02	41
09/18/01	Santa Cruz	Sea Mussel, wild	Santa Cruz Pier	42
09/19/01	Marin	Bay Mussel, Sentinel	Drakes Estero, Bed #12	46
09/19/01	Marin	Bay Mussel, Sentinel	Drakes Estero, Channel Buoy	43
09/23/01	Marin	Pacific Oyster, cultured	Drakes Estero, Bed #12	**104**
09/23/01	Marin	Bay Mussel, Sentinel	Drakes Estero, Bed #12	**127**
09/23/01	Marin	Pacific Oyster, cultured	Drakes Estero, Bed #38	51
09/23/01	Marin	Bay Mussel, Sentinel	Drakes Estero, Channel Buoy	**477**
09/24/01	Sonoma	Sea Mussel, Sentinel	Bodega Harbor, Doran Park	51
09/24/01	Sonoma	Sea Mussel, wild	Salt Point State Park	**122**
09/24/01	Marin	Sea Mussel, Sentinel	Drakes Bay, Chimney Rock LBS	**535**
09/24/01	San Luis Obispo	Bay Mussel, cultured	Morro Bay	40
09/25/01	Humboldt	Sea Mussel, Sentinel	Humboldt Bay, Indian Is. Ch.	50
09/25/01	Humboldt	Sea Mussel, Sentinel	Humboldt Bay, USCG Station	**112**
09/26/01	Marin	Sea Mussel, Sentinel	Drakes Bay, Chimney Rock LBS	**189**
09/26/01	Marin	Pacific Oyster, cultured	Drakes Estero, Bed #12	77
09/26/01	Marin	Bay Mussel, Sentinel	Drakes Estero, Bed #12	**211**
09/26/01	Marin	Bay Mussel, Sentinel	Drakes Estero, Channel Buoy	**413**
09/27/01	Humboldt	Sea Mussel, Sentinel	Humboldt Bay, Indian Is. Ch.	47
09/27/01	Humboldt	Sea Mussel, Sentinel	Humboldt Bay, USCG Station	65
09/27/01	Marin	Pacific Oyster, cultured	Drakes Estero, Bed #12	50
09/27/01	Marin	Bay Mussel, Sentinel	Drakes Estero, Bed #12	**264**
09/27/01	Marin	Bay Mussel, Sentinel	Drakes Estero, Channel Buoy	**246**

09/27/01	Marin	Pacific Oyster, cultured	Tomales Bay, Lease #M430-02	42
OCTOBER				
10/02/01	Humboldt	Sea Mussel, Sentinel	Humboldt Bay, Indian Is. Ch.	41
10/02/01	Humboldt	Sea Mussel, Sentinel	Humboldt Bay, USCG Station	44
10/02/01	Marin	Sea Mussel, Sentinel	Drakes Bay, Chimney Rock LBS	56
10/02/01	Marin	Pacific Oyster, cultured	Drakes Estero, Bed #12	41
10/02/01	Marin	Bay Mussel, Sentinel	Drakes Estero, Bed #12	71
10/02/01	Marin	Bay Mussel, Sentinel	Drakes Estero, Channel Buoy	**82**
10/02/01	Marin	Pacific Oyster, cultured	Tomales Bay, Lease #M430-02	39
10/02/01	Santa Cruz	Sea Mussel, wild	Santa Cruz Pier	43
10/04/01	Marin	Pacific Oyster, cultured	Drakes Estero, Bed #12	43
10/04/01	Marin	Bay Mussel, Sentinel	Drakes Estero, Bed #12	72
10/04/01	Marin	Bay Mussel, Sentinel	Drakes Estero, Channel Buoy	55
10/07/01	Marin	Pacific Oyster, cultured	Tomales Bay, Lease #M430-02	63
10/08/01	Sonoma	Sea Mussel, Sentinel	Bodega Harbor, USCG Dock	60
10/09/01	Humboldt	Sea Mussel, Sentinel	Humboldt Bay, Indian Is. Ch.	40
10/09/01	Humboldt	Sea Mussel, Sentinel	Humboldt Bay, USCG Station	41
10/09/01	Marin	Bay Mussel, Sentinel	Drakes Estero, Bed #12	58
10/09/01	Marin	Bay Mussel, Sentinel	Drakes Estero, Channel Buoy	55
10/10/01	Marin	Pacific Oyster, cultured	Tomales Bay, Lease #M430-02	67
10/10/01	Marin	Pacific Oyster, cultured	Tomales Bay, Lease #M430-11	45
10/11/01	Santa Cruz	Sea Mussel, wild	Santa Cruz Pier	39
10/12/01	Marin	Pacific Oyster, cultured	Tomales Bay, Lease #M430-14	43
10/13/01	Marin	Pacific Oyster, cultured	Tomales Bay, Lease #M430-11	44
10/13/01	Marin	Bay Mussel, cultured	Tomales Bay, Lease #M430-15	51
10/14/01	Marin	Pacific Oyster, cultured	Tomales Bay, Lease #M430-02	50
10/15/01	San Luis Obispo	Bay Mussel, cultured	Morro Bay	40
10/16/01	Del Norte	Sea Mussel, wild	Point St. George	46
10/16/01	Humboldt	Sea Mussel, Sentinel	Humboldt Bay, USCG Station	41
10/16/01	Marin	Sea Mussel, Sentinel	Drakes Bay, Chimney Rock LBS	43
10/16/01	Marin	Bay Mussel, Sentinel	Drakes Estero, Bed #12	43
10/16/01	Marin	Bay Mussel, Sentinel	Drakes Estero, Channel Buoy	44
10/16/01	Santa Cruz	Sea Mussel, wild	Santa Cruz Pier	39

10/17/01	Marin	Pacific Oyster, cultured	Tomales Bay, Lease #M430-02	49
10/17/01	San Mateo	Sea Mussel, wild	Pescadero State Beach	40
10/18/01	Marin	Pacific Oyster, cultured	Tomales Bay, Lease #M430-14	42
10/21/01	Marin	Pacific Oyster, cultured	Tomales Bay, Lease #M430-02	56
10/22/01	Sonoma	Sea Mussel, Sentinel	Bodega Harbor, Doran Park	61
10/22/01	San Luis Obispo	Bay Mussel, cultured	Morro Bay	42
10/23/01	Humboldt	Sea Mussel, Sentinel	Humboldt Bay, Indian Is. Ch.	40
10/23/01	Humboldt	Sea Mussel, Sentinel	Humboldt Bay, USCG Station	46
10/23/01	Marin	Bay Mussel, Sentinel	Drakes Estero, Bed #12	40
10/23/01	Marin	Bay Mussel, Sentinel	Drakes Estero, Channel Buoy	40
10/23/01	Santa Cruz	Sea Mussel, wild	Santa Cruz Pier	**81**
10/29/01	San Luis Obispo	Bay Mussel, cultured	Morro Bay	43
10/30/01	Humboldt	Sea Mussel, Sentinel	Humboldt Bay, Indian Is. Ch.	42
10/30/01	Humboldt	Sea Mussel, Sentinel	Humboldt Bay, USCG Station	58
10/30/01	Marin	Pacific Oyster, cultured	Tomales Bay, Lease #M430-02	43
10/31/01	Sonoma	Sea Mussel, wild	Salt Point State Park	**102**
10/31/01	Santa Cruz	Sea Mussel, wild	Santa Cruz Pier	37
NOVEMBER				
11/01/01	Humboldt	Sea Mussel, Sentinel	Humboldt Bay, Indian Is. Ch.	42
11/01/01	Santa Cruz	Sea Mussel, wild	Natural Bridges	43
11/01/01	Santa Cruz	Sea Mussel, wild	Santa Cruz, Sunny Cove	70
11/02/01	Marin	Sea Mussel, Sentinel	Drakes Bay, Chimney Rock LBS	38
11/05/01	Santa Cruz	Sea Mussel, wild	Santa Cruz Pier	41
11/06/01	Humboldt	Sea Mussel, Sentinel	Humboldt Bay, USCG Station	62
11/06/01	Marin	Pacific Oyster, cultured	Tomales Bay, Lease #M430-02	37
11/06/01	Marin	Pacific Oyster, cultured	Tomales Bay, Lease #M430-11	37
11/07/01	Sonoma	Sea Mussel, wild	Salt Point State Park	50
11/13/01	Humboldt	Sea Mussel, Sentinel	Humboldt Bay, USCG Station	53
11/13/01	Sonoma	Sea Mussel, wild	Bodega Harbor, USCG Dock	41
11/14/01	Del Norte	Sea Mussel, wild	Point St. George	78
11/14/01	Santa Cruz	Sea Mussel, wild	Santa Cruz Pier	44
11/16/01	Santa Cruz	Sea Mussel, wild	Santa Cruz, Sunny Cove	41
11/20/01	Humboldt	Sea Mussel, Sentinel	Humboldt Bay, Indian Is. Ch.	39

11/20/01	Humboldt	Sea Mussel, Sentinel	Humboldt Bay, USCG Station	46
11/21/01	Santa Cruz	Sea Mussel, wild	Santa Cruz Pier	40
11/27/01	Humboldt	Sea Mussel, Sentinel	Humboldt Bay, Indian Is. Ch.	48
11/27/01	Humboldt	Sea Mussel, Sentinel	Humboldt Bay, USCG Station	55
DECEMBER				
12/04/01	Humboldt	Sea Mussel, Sentinel	Humboldt Bay, Indian Is. Ch.	42
12/04/01	Humboldt	Sea Mussel, Sentinel	Humboldt Bay, USCG Station	45
12/11/01	Humboldt	Sea Mussel, Sentinel	Humboldt Bay, Indian Is. Ch.	41
12/11/01	Humboldt	Sea Mussel, Sentinel	Humboldt Bay, USCG Station	43
12/12/01	Del Norte	Sea Mussel, wild	Point St. George	50
12/18/01	Humboldt	Sea Mussel, Sentinel	Humboldt Bay, Indian Is. Ch.	39
12/18/01	Humboldt	Bay Mussel, Sentinel	Humboldt Bay, USCG Station	42
12/26/01	Humboldt	Sea Mussel, Sentinel	Humboldt Bay, Indian Is. Ch.	44
12/26/01	Humboldt	Bay Mussel, Sentinel	Humboldt Bay, USCG Station	41

FIGURES 1 – 3.

Figure 1a. Locations of shellfish sampling stations during 2001 (Del Norte to Monterey counties).

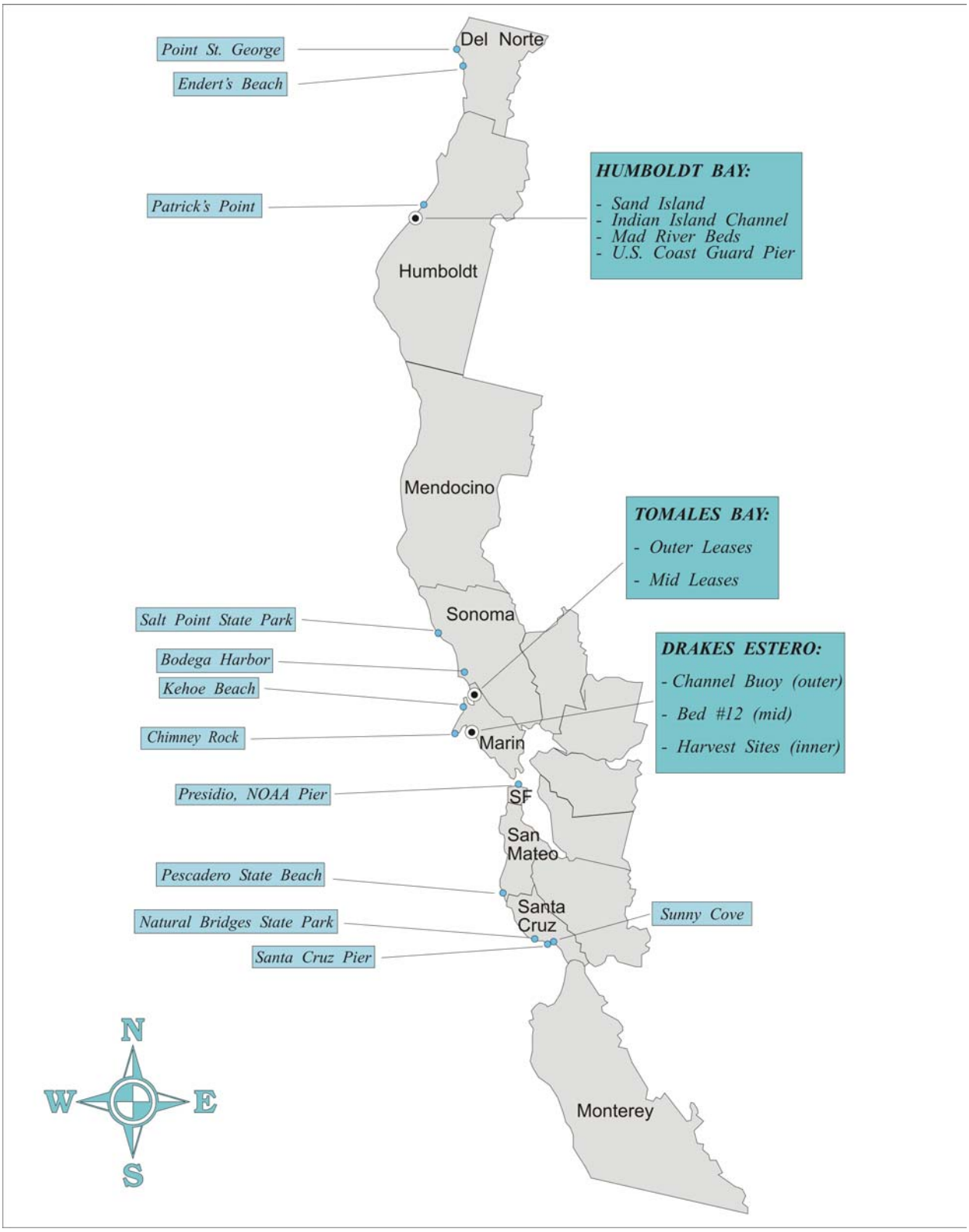


Figure 1b. Locations of shellfish sampling stations during 2001 (San Luis Obispo to San Diego counties).

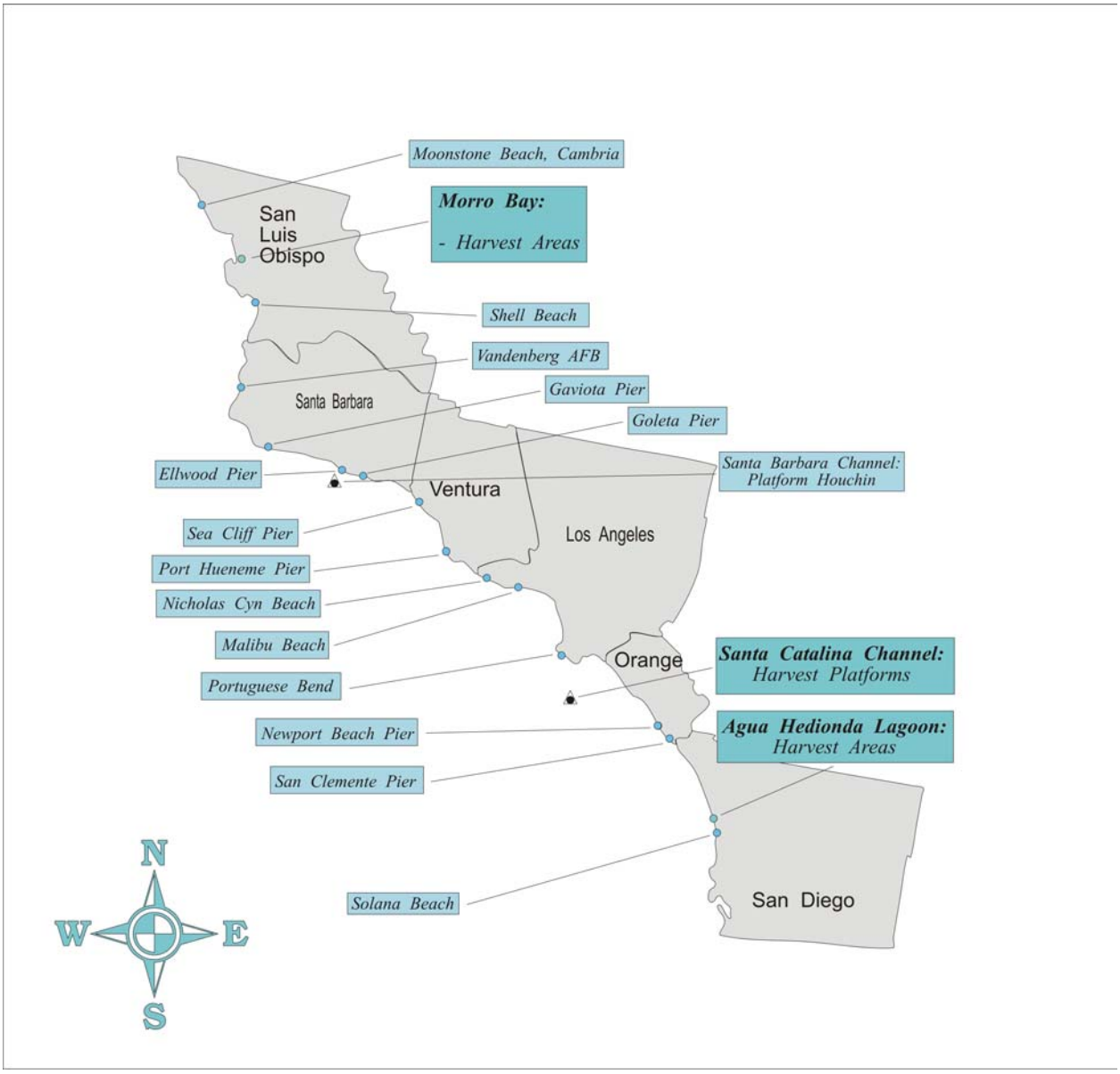


Figure 1c. Locations of phytoplankton sampling stations during 2001 (Del Norte to Monterey counties).

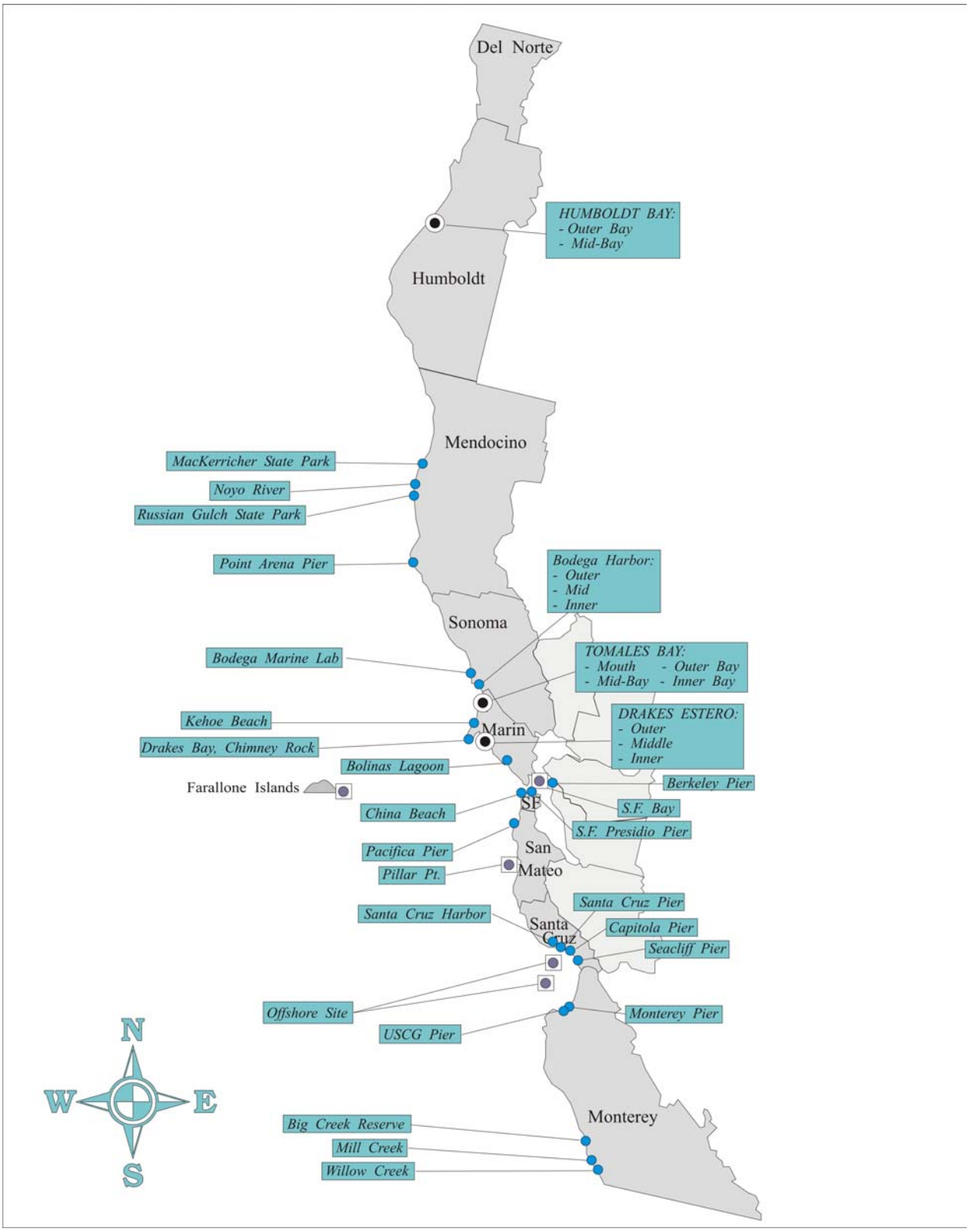


Figure 1d. Locations of phytoplankton sampling stations during 2001 (San Luis Obispo to San Diego counties).

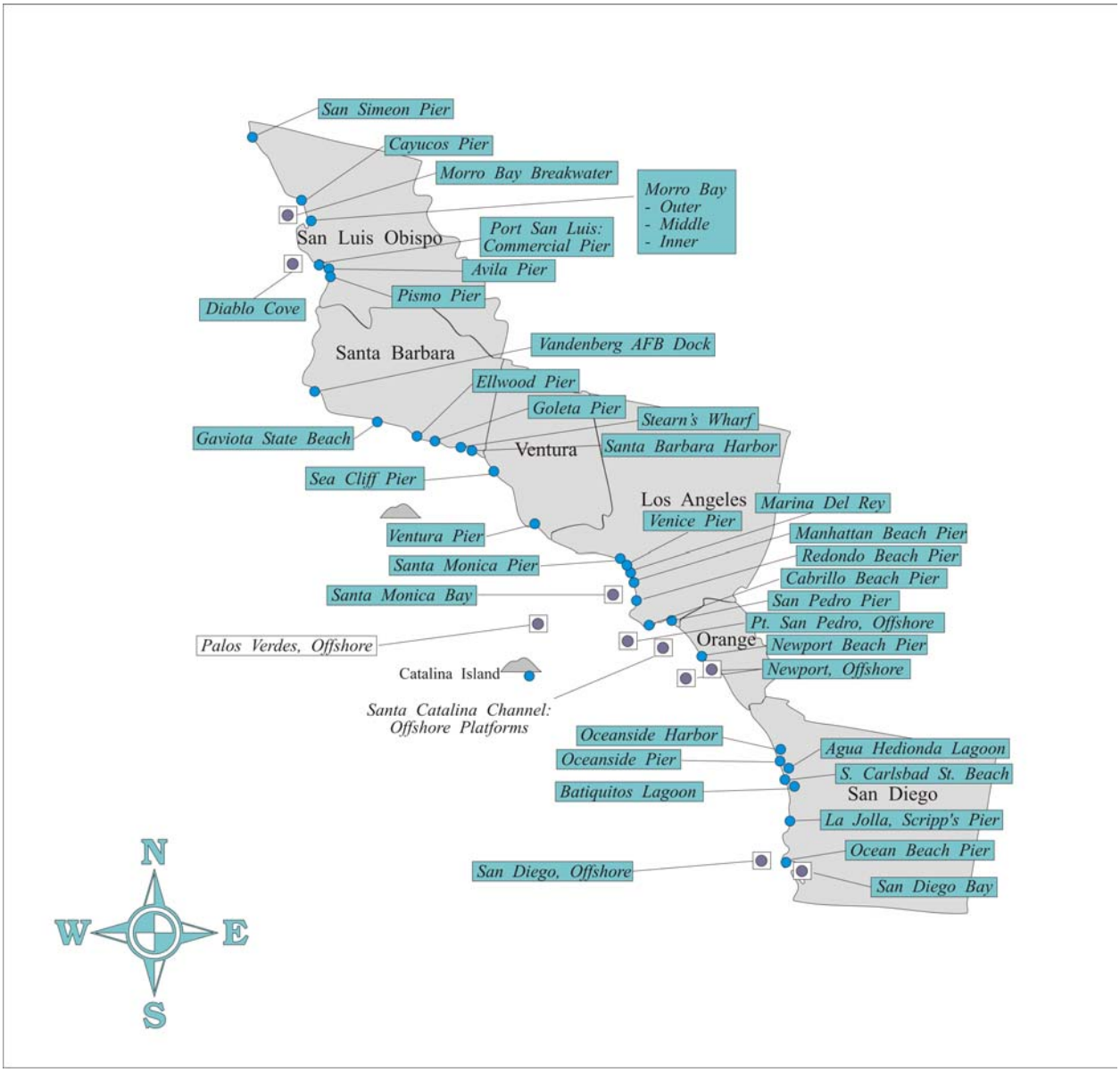


Figure 2. Annual PSP toxin levels in California shellfish from 1991 through 2001.

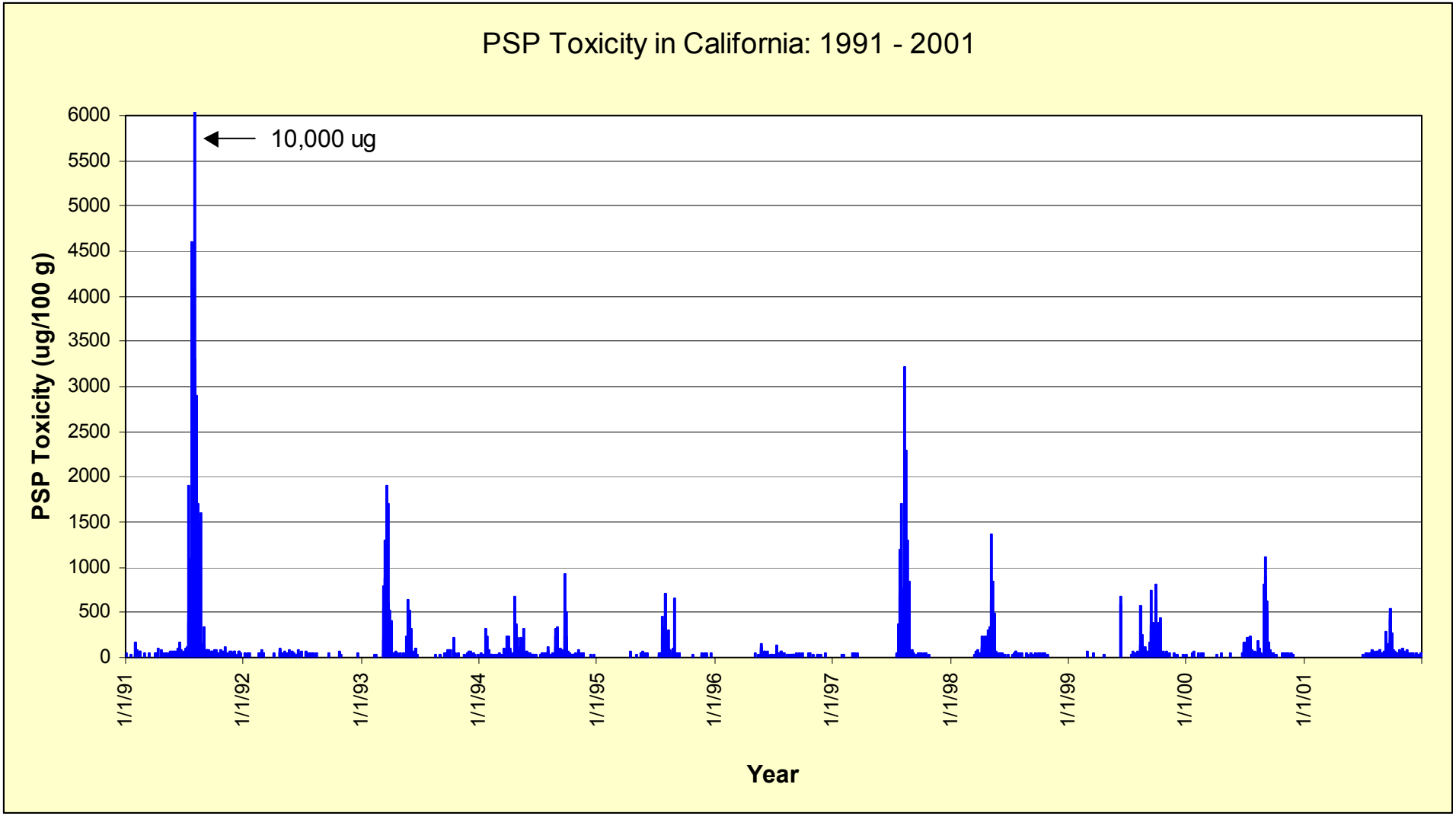
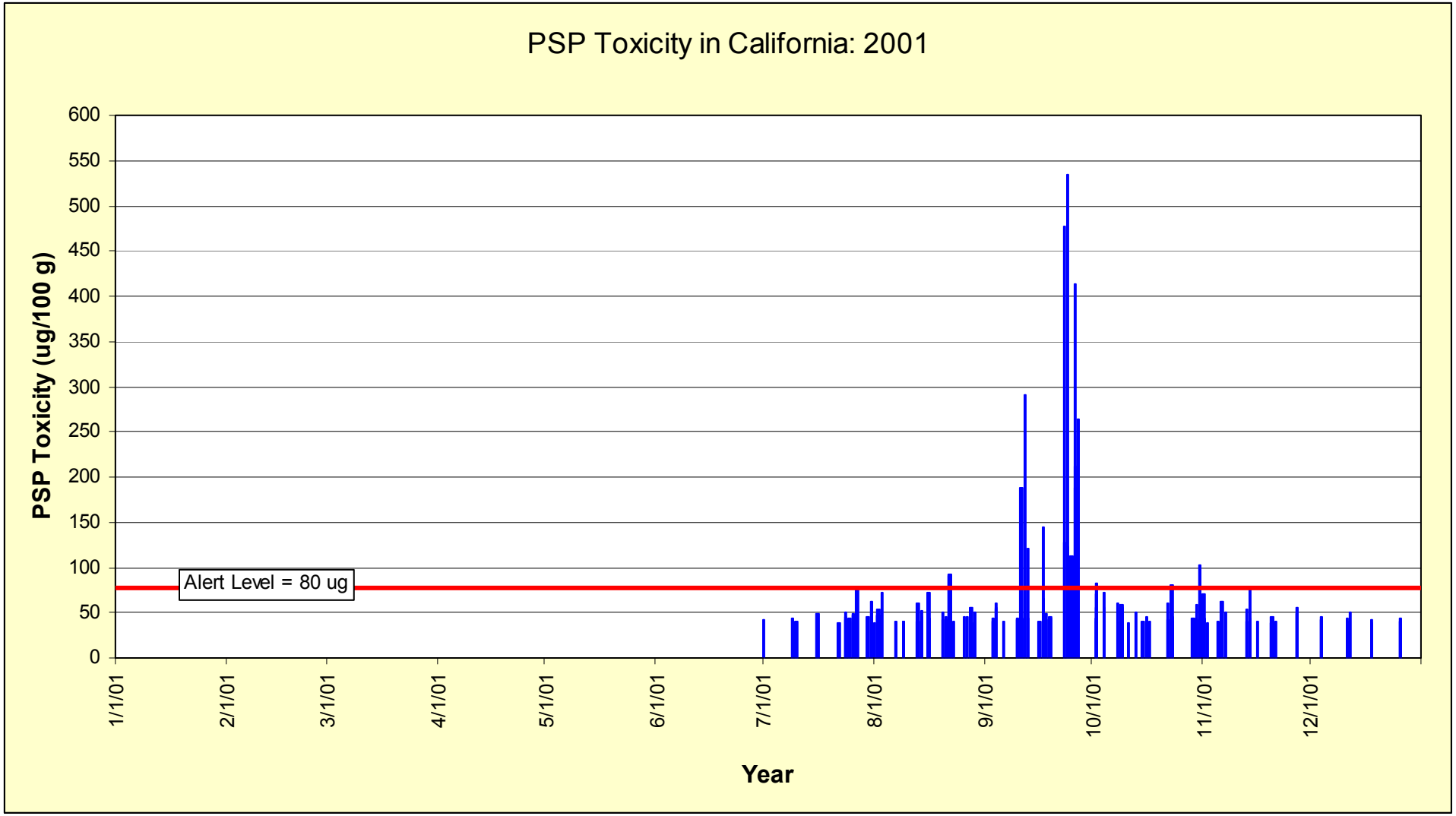


Figure 3. Temporal distribution of PSP toxin levels in California shellfish during 2001.



APPENDIX A.

Monthly maps of PSP toxin distribution and sampling effort during 2001.

CALIFORNIA DEPARTMENT OF HEALTH SERVICES
2151 Berkeley Way, Berkeley CA 94704-1011

ENVIRONMENTAL MANAGEMENT BRANCH
Marine Biotoxin Monitoring and Control Program

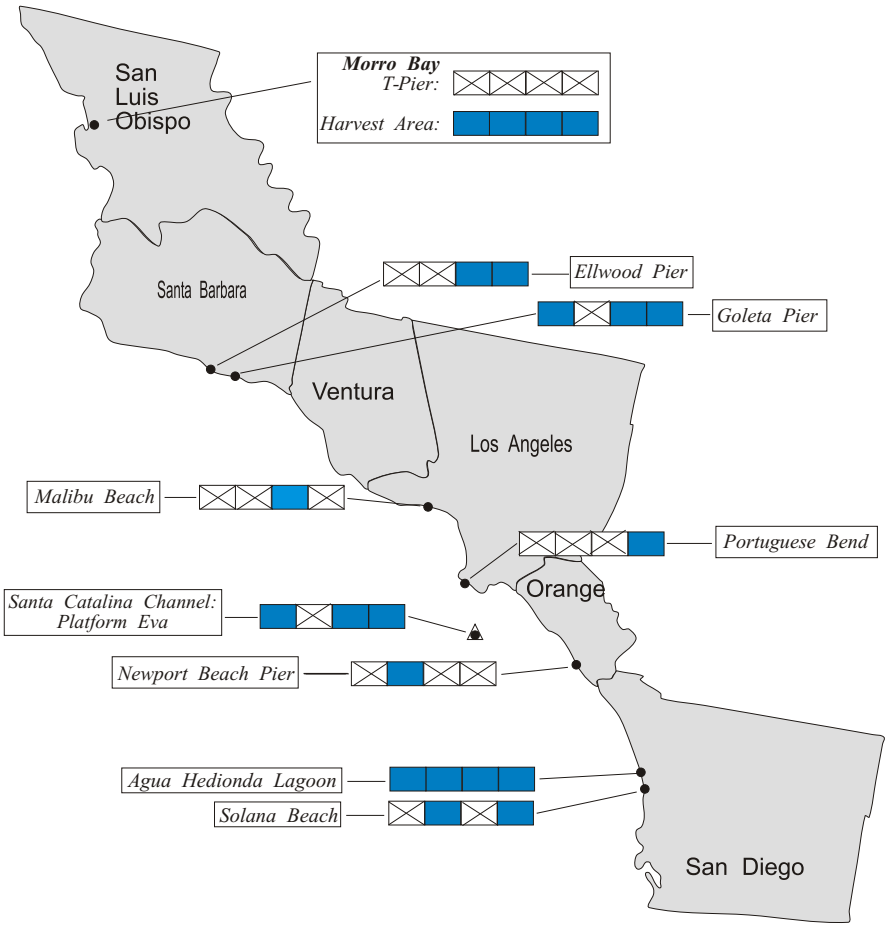
SHELLFISH BIOTOXIN MONTHLY REPORT

January 2001

Technical Report No. 01-06

Distribution of Shellfish Biotoxins

Southern California



KEY FOR SHELLFISH BIOTOXIN DATA

Week:	1	2	3	4
PSP Range: (ug/100 g)	no sample	not detected	< 80[1]	≥80
DA Range: (ppm)	no sample	not detected	< 20[2]	≥20

[1]PSP Alert Level [2]DA Alert Level
● = Single Site ◉ = Multiple Sites ▲ = Offshore Site

Source: DHS Marine Biotoxin Monitoring and Control Program, January 2001.

INTRODUCTION:

Please note the following conventions: (i) All data are for mussel samples, unless otherwise noted; (ii) All samples are analyzed for PSP toxins; domoic acid (DA) analyses are performed as needed (i.e., on the basis of detected blooms of the diatoms that produce DA). Please refer to the figure key for an explanation of the symbols used for the time of month of sample collection and the toxicity range.

Southern California Summary:

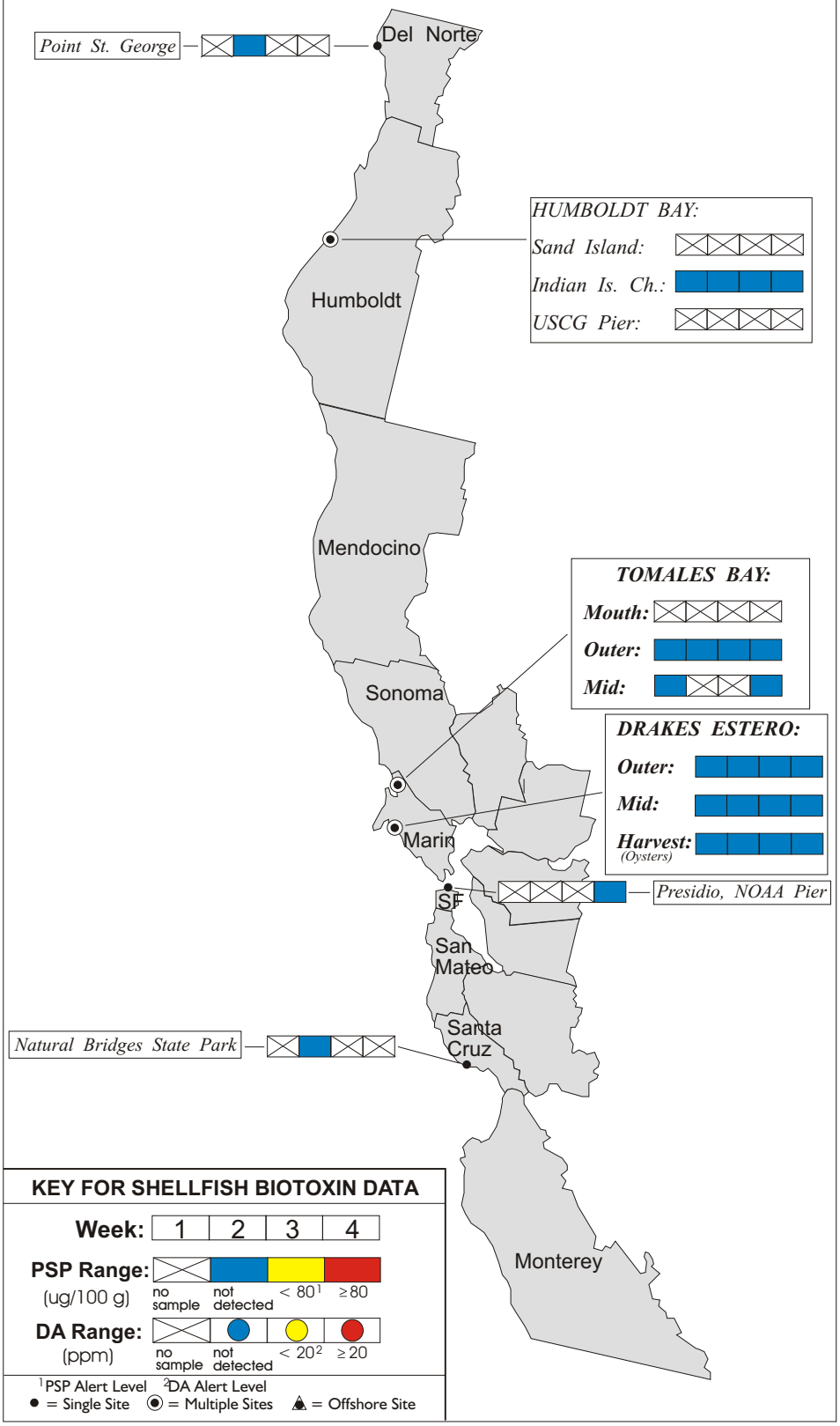
Paralytic Shellfish Poisoning (PSP): PSP toxins were not detected in shellfish samples from southern California sites in January.

For Information on our Volunteer Field Sampling Program Please Call:

(510) 540-3423

Distribution of Shellfish Biotoxins

Northern California



Northern California Summary:

Paralytic Shellfish Poisoning (PSP):

PSP toxicity was not detected at any northern California site during January.

The Marine Biotoxin Monitoring and Control Program is a state-wide effort involving a consortium of volunteer participants. The shellfish sampling and analysis element of this program is intended to provide an early warning of shellfish toxicity by routinely assessing coastal resources for the presence of paralytic shellfish poisoning (PSP) toxins.

For More Information Please Call:
(510) 540 - 3423

For Recorded Biotoxin Information Call:
(800) 553 - 4133

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ENVIRONMENTAL MANAGEMENT BRANCH
Marine Biotoxin Monitoring and Control Program

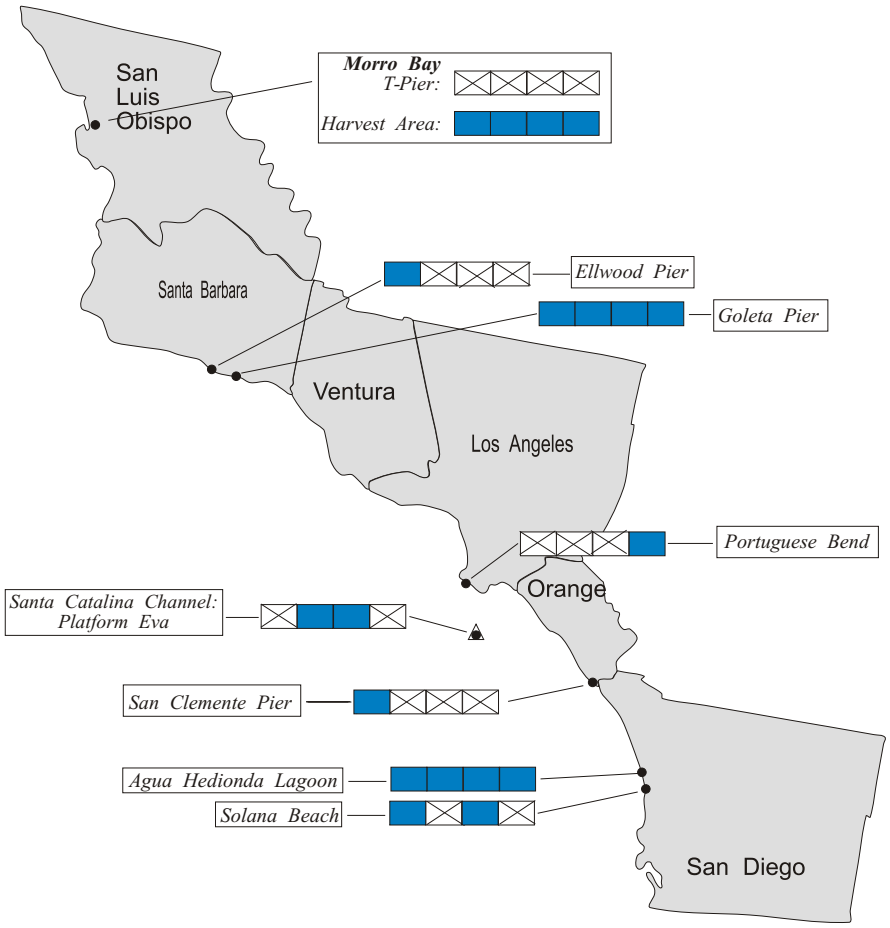
SHELLFISH BIOTOXIN MONTHLY REPORT

February 2001

Technical Report No. 01-08

Distribution of Shellfish Biotoxins

Southern California



KEY FOR SHELLFISH BIOTOXIN DATA

	Week: 1	2	3	4
PSP Range: (ug/100 g)	no sample	not detected	< 80[1]	≥80
DA Range: (ppm)	no sample	not detected	< 20[2]	≥20

[1]PSP Alert Level [2]DA Alert Level
● = Single Site ◉ = Multiple Sites ▲ = Offshore Site

Source: DHS Marine Biotoxin Monitoring and Control Program, February 2001.

INTRODUCTION:

Please note the following conventions: (i) All data are for mussel samples, unless otherwise noted; (ii) All samples are analyzed for PSP toxins; domoic acid (DA) analyses are performed as needed (i.e., on the basis of detected blooms of the diatoms that produce DA). Please refer to the figure key for an explanation of the symbols used for the time of month of sample collection and the toxicity range.

Southern California Summary:

Paralytic Shellfish Poisoning (PSP): PSP toxins were not detected in shellfish samples from southern California sites in February.

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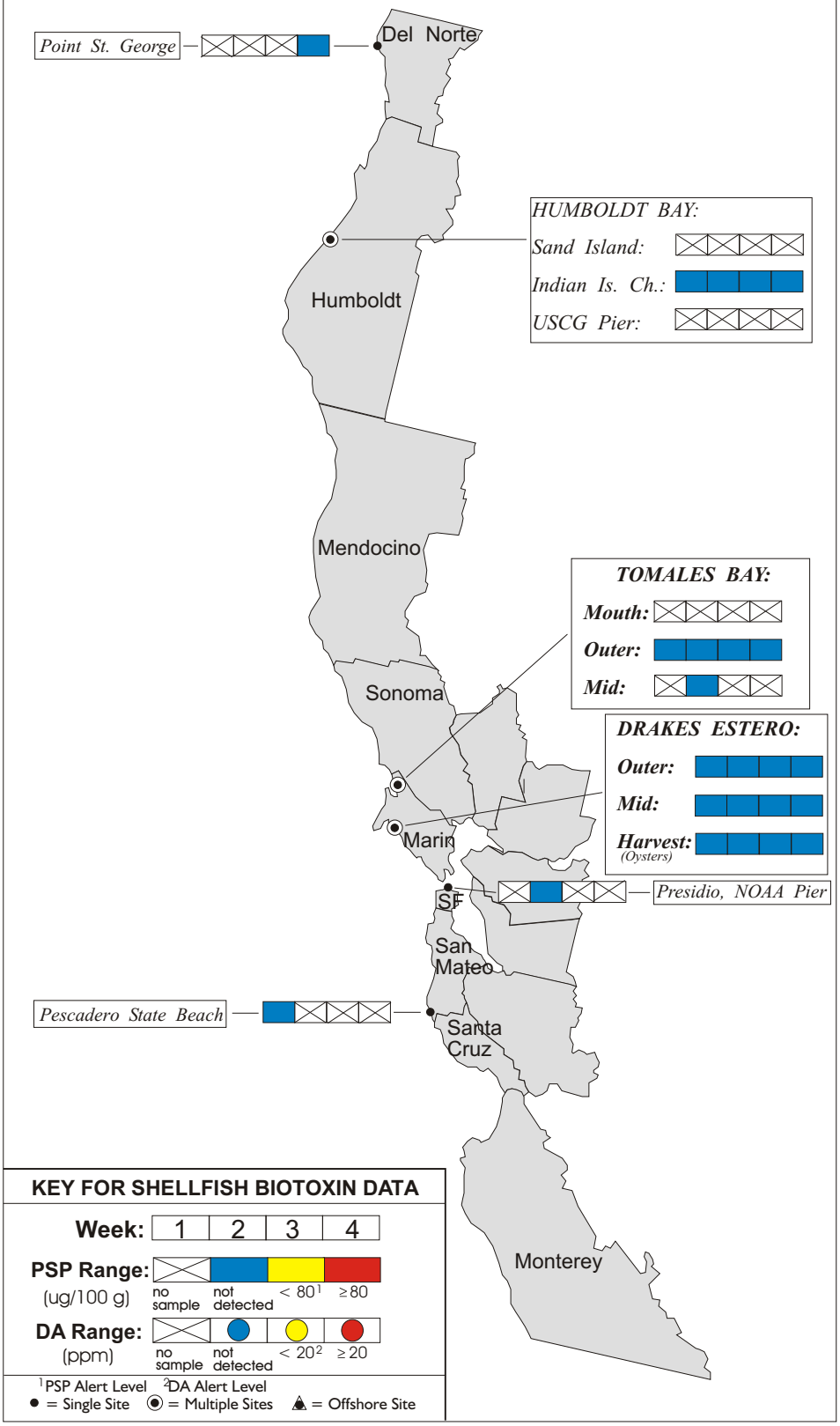
Distribution of Shellfish Biotoxins

Northern California



Northern California Summary:

Paralytic Shellfish Poisoning (PSP):

PSP toxicity was not detected at any northern California site during February.

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ENVIRONMENTAL MANAGEMENT BRANCH
Marine Biotoxin Monitoring and Control Program

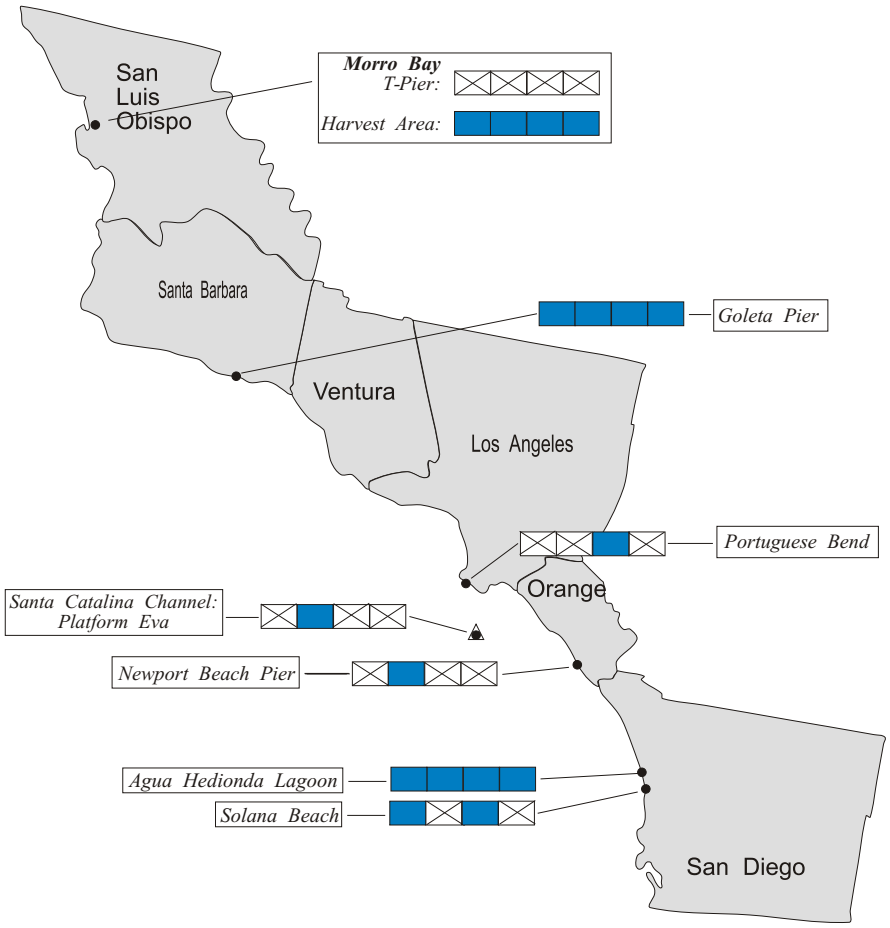
SHELLFISH BIOTOXIN MONTHLY REPORT

March 2001

Technical Report No. 01-10

Distribution of Shellfish Biotoxins

Southern California



KEY FOR SHELLFISH BIOTOXIN DATA

Week:	1	2	3	4
PSP Range: (ug/100 g)	no sample	not detected	< 80[1]	≥80
DA Range: (ppm)	no sample	not detected	< 20[2]	≥20

[1]PSP Alert Level [2]DA Alert Level
● = Single Site ◉ = Multiple Sites ▲ = Offshore Site

Source: DHS Marine Biotoxin Monitoring and Control Program, March 2001.

INTRODUCTION:

Please note the following conventions: (i) All data are for mussel samples, unless otherwise noted; (ii) All samples are analyzed for PSP toxins; domoic acid (DA) analyses are performed as needed (i.e., on the basis of detected blooms of the diatoms that produce DA). Please refer to the figure key for an explanation of the symbols used for the time of month of sample collection and the toxicity range.

Southern California Summary:

Paralytic Shellfish Poisoning (PSP): PSP toxins were not detected in shellfish samples from southern California sites in March.

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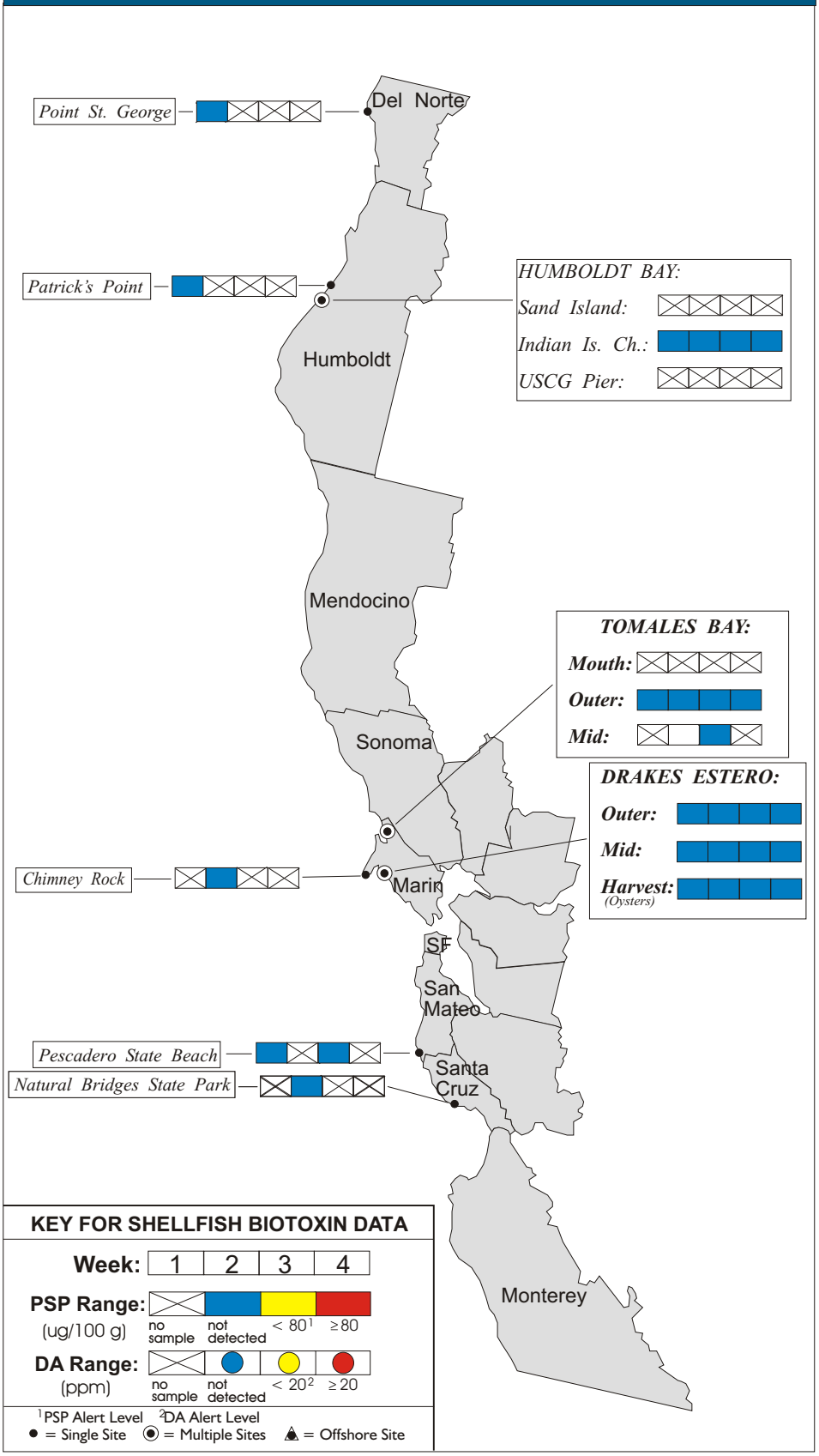
Distribution of Shellfish Biotoxins

Northern California



Northern California Summary:

Paralytic Shellfish Poisoning (PSP):

PSP toxicity was not detected at any northern California site during March.

The Marine Biotoxin Monitoring and Control Program is a state-wide effort involving a consortium of volunteer participants. The shellfish sampling and analysis element of this program is intended to provide an early warning of shellfish toxicity by routinely assessing coastal resources for the presence of paralytic shellfish poisoning (PSP) toxins.

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ENVIRONMENTAL MANAGEMENT BRANCH
Marine Biotoxin Monitoring and Control Program

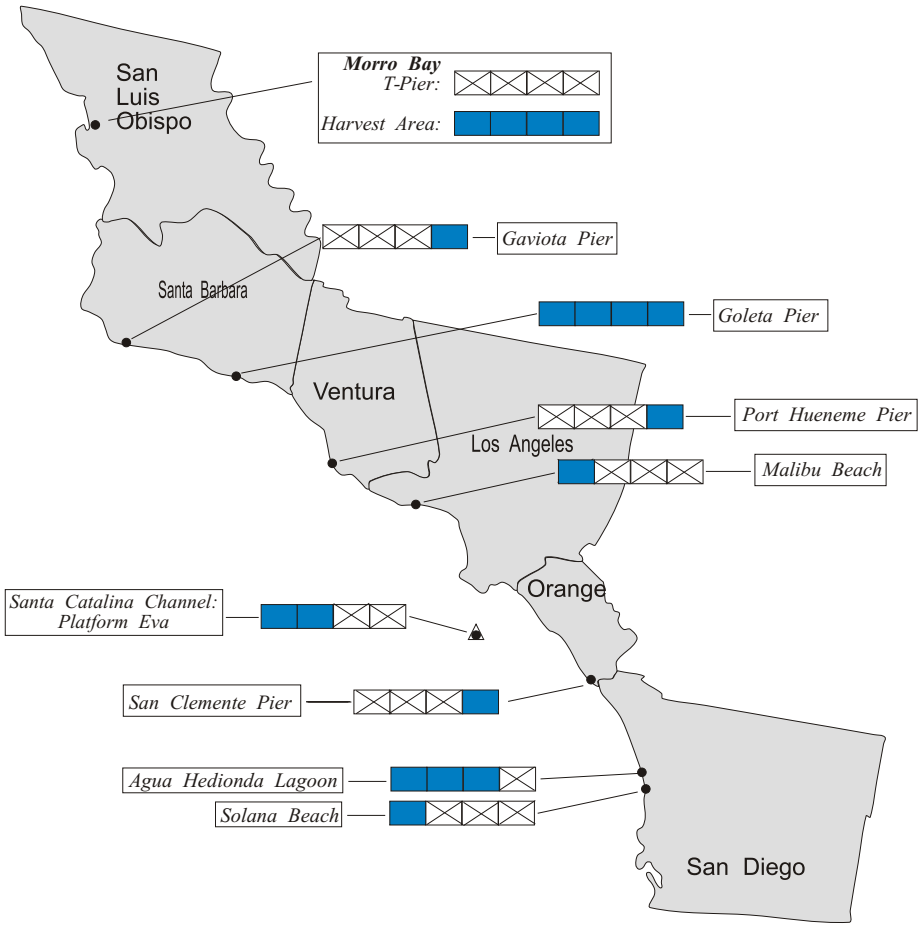
SHELLFISH BIOTOXIN MONTHLY REPORT

April 2001

Technical Report No. 01-13

Distribution of Shellfish Biotoxins

Southern California



KEY FOR SHELLFISH BIOTOXIN DATA

Week:	1	2	3	4
PSP Range: (ug/100 g)	no sample	not detected	< 80[1]	≥80
DA Range: (ppm)	no sample	not detected	< 20[2]	≥20

[1]PSP Alert Level [2]DA Alert Level
● = Single Site ◉ = Multiple Sites ▲ = Offshore Site

Source: DHS Marine Biotoxin Monitoring and Control Program, April 2001.

INTRODUCTION:

Please note the following conventions: (i) All data are for mussel samples, unless otherwise noted; (ii) All samples are analyzed for PSP toxins; domoic acid (DA) analyses are performed as needed (i.e., on the basis of detected blooms of the diatoms that produce DA). Please refer to the figure key for an explanation of the symbols used for the time of month of sample collection and the toxicity range.

Southern California Summary:

Paralytic Shellfish Poisoning (PSP): PSP toxins were not detected in shellfish samples from southern California sites in April.

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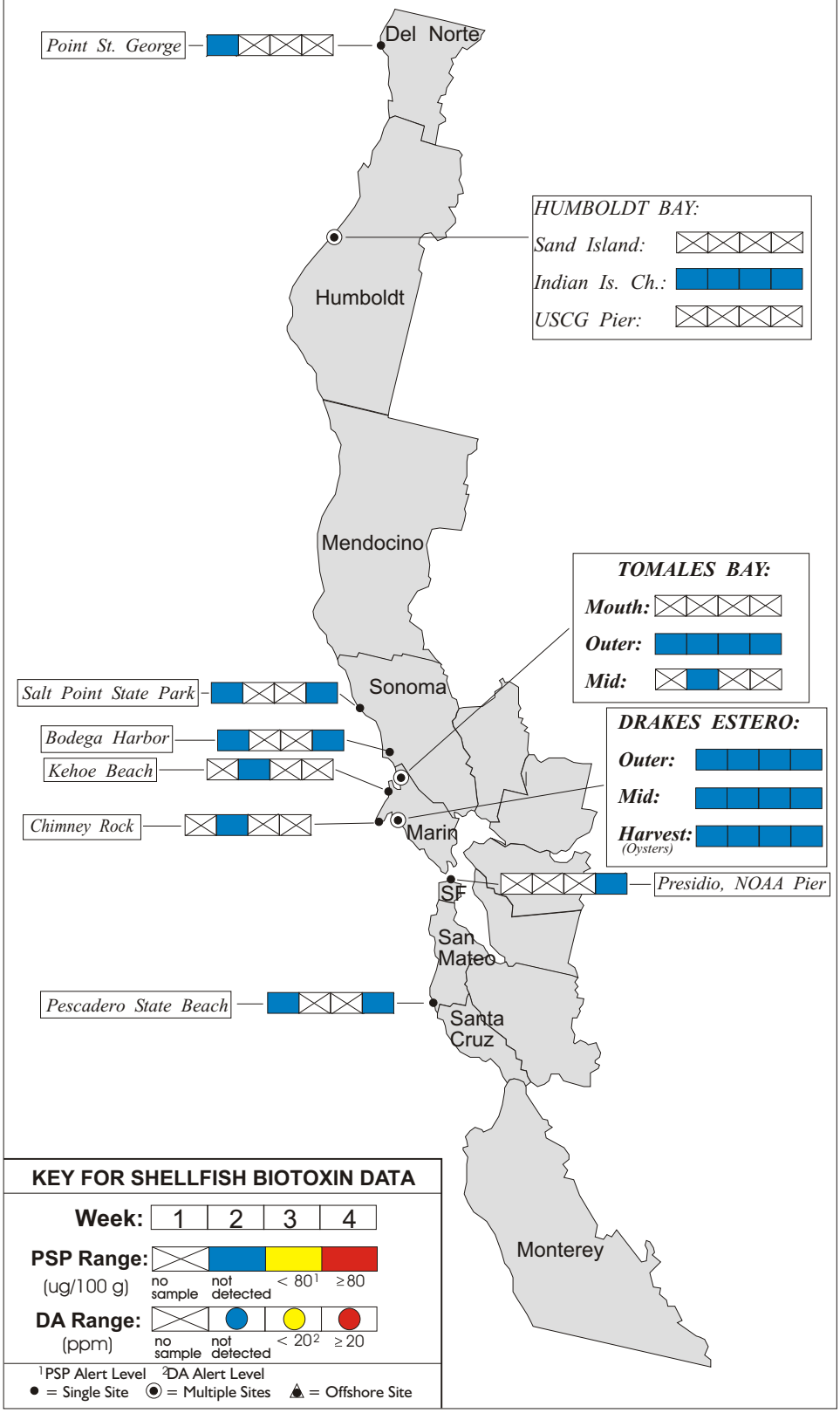
Distribution of Shellfish Biotoxins

Northern California



Northern California Summary:

Paralytic Shellfish Poisoning (PSP):

PSP toxicity was not detected at any northern California site during April.

The Marine Biotoxin Monitoring and Control Program is a state-wide effort involving a consortium of volunteer participants. The shellfish sampling and analysis element of this program is intended to provide an early warning of shellfish toxicity by routinely assessing coastal resources for the presence of paralytic shellfish poisoning (PSP) toxins.

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(800) 553 - 4133

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2151 Berkeley Way, Berkeley CA 94704-1011

ENVIRONMENTAL MANAGEMENT BRANCH
Marine Biotoxin Monitoring and Control Program

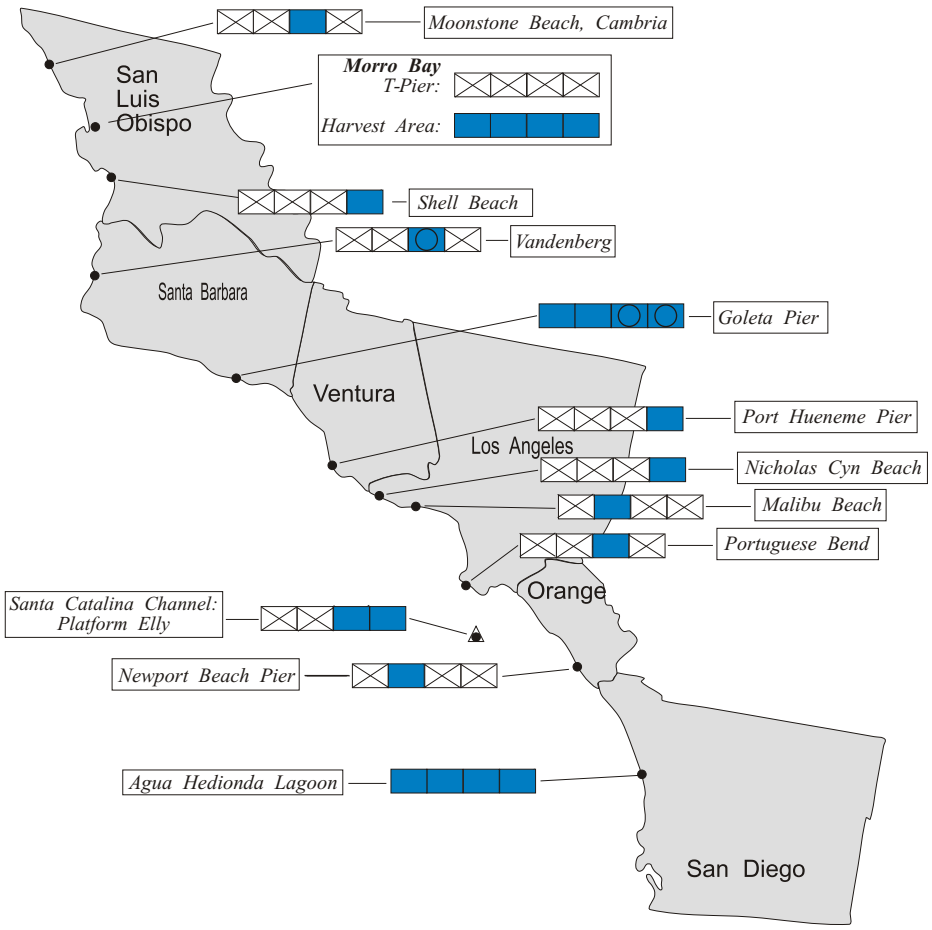
SHELLFISH BIOTOXIN MONTHLY REPORT

May 2001

Technical Report No. 01-15

Distribution of Shellfish Biotoxins

Southern California



KEY FOR SHELLFISH BIOTOXIN DATA

	Week: 1	2	3	4
PSP Range: (ug/100 g)	no sample	not detected	< 80[1]	≥80
DA Range: (ppm)	no sample	not detected	< 20[2]	≥20

[1]PSP Alert Level [2]DA Alert Level
● = Single Site ◉ = Multiple Sites ▲ = Offshore Site

Source: DHS Marine Biotoxin Monitoring and Control Program, May 2001.

INTRODUCTION:

Please note the following conventions: (i) All data are for mussel samples, unless otherwise noted; (ii) All samples are analyzed for PSP toxins; domoic acid (DA) analyses are performed as needed (i.e., on the basis of detected blooms of the diatoms that produce DA). Please refer to the figure key for an explanation of the symbols used for the time of month of sample collection and the toxicity range.

Southern California Summary:

Paralytic Shellfish Poisoning (PSP): PSP toxins were not detected in shellfish samples from southern California sites in May.

Domoic Acid (DA):

Samples from two sites were analyzed for the presence of domoic acid due to observations of increased Pseudo-nitzschia in this region. All samples were absent of DA.

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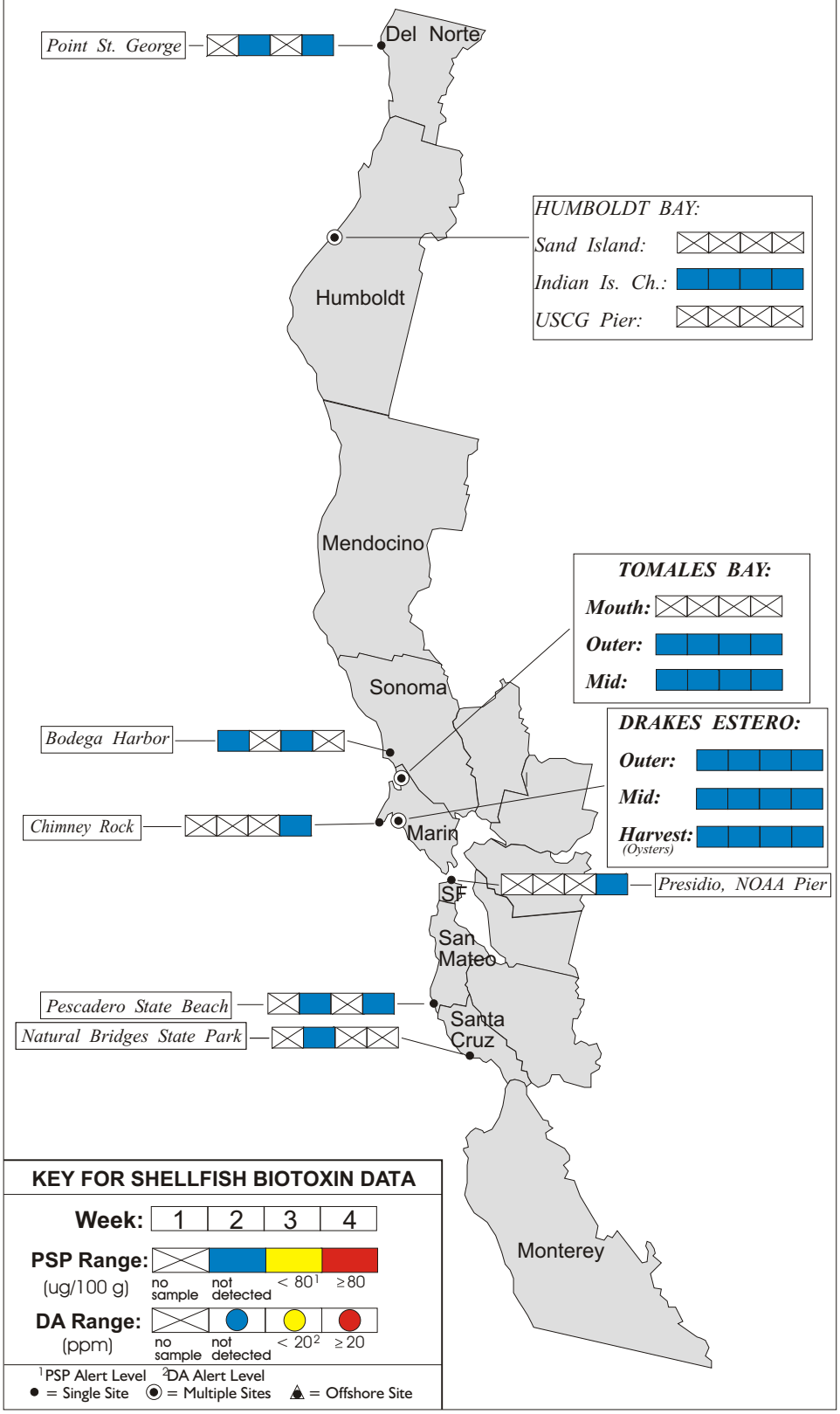
Distribution of Shellfish Biotoxins

Northern California



Northern California Summary:

Paralytic Shellfish Poisoning (PSP):

PSP toxicity was not detected at any northern California site during May.

The Marine Biotoxin Monitoring and Control Program is a state-wide effort involving a consortium of volunteer participants. The shellfish sampling and analysis element of this program is intended to provide an early warning of shellfish toxicity by routinely assessing coastal resources for the presence of paralytic shellfish poisoning (PSP) toxins.

For More Information Please Call:
(510) 540 - 3423

For Recorded Biotoxin Information Call:
(800) 553 - 4133

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2151 Berkeley Way, Berkeley CA 94704-1011

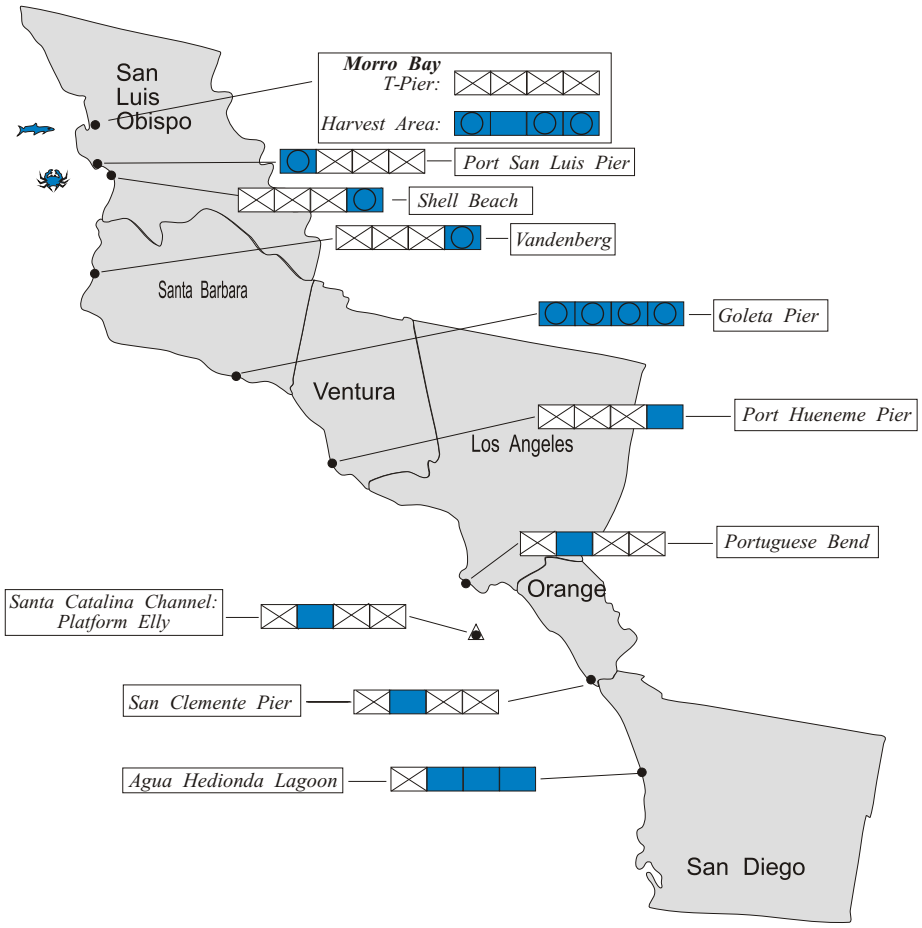
ENVIRONMENTAL MANAGEMENT BRANCH
Marine Biotoxin Monitoring and Control Program

SHELLFISH BIOTOXIN MONTHLY REPORT

June 2001

Technical Report No. 01-17

Distribution of Shellfish Biotoxins
Southern California



KEY FOR SHELLFISH BIOTOXIN DATA

Week:	1	2	3	4
PSP Range: (ug/100 g)	no sample	not detected	< 80[1]	≥80
DA Range: (ppm)	no sample	not detected	< 20[2]	≥20

[1]PSP Alert Level [2]DA Alert Level
● = Single Site ◉ = Multiple Sites ▲ = Offshore Site

Source: DHS Marine Biotoxin Monitoring and Control Program, June 2001.

INTRODUCTION:

Please note the following conventions: (i) All data are for mussel samples, unless otherwise noted; (ii) All samples are analyzed for PSP toxins; domoic acid (DA) analyses are performed as needed (i.e., on the basis of detected blooms of the diatoms that produce DA). Please refer to the figure key for an explanation of the symbols used for the time of month of sample collection and the toxicity range.

Southern California Summary:

Paralytic Shellfish Poisoning (PSP): PSP toxins were not detected in shellfish samples from southern California sites in June.

Domoic Acid (DA):

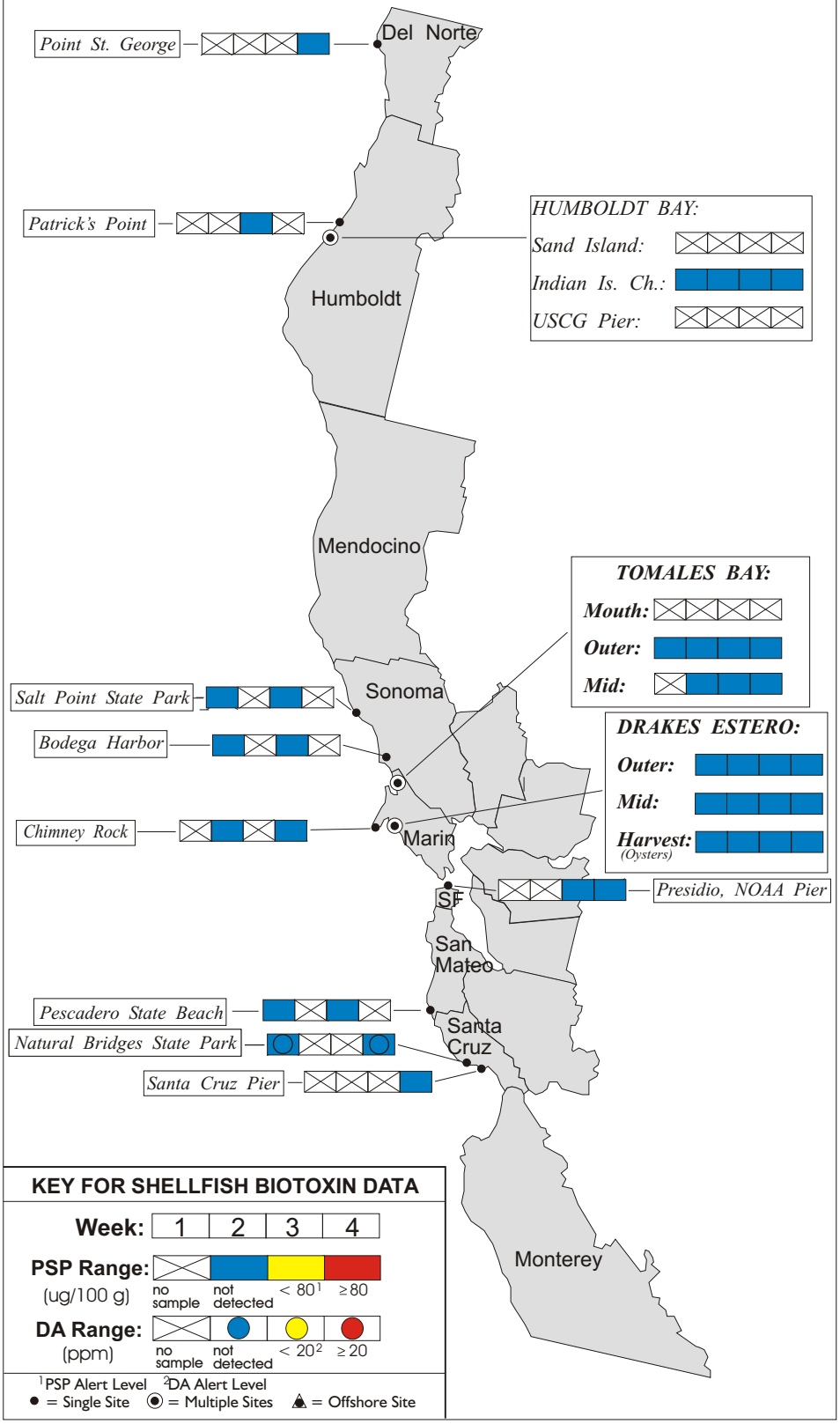
Shellfish, crab and anchovy samples from the San Luis Obispo coast were analyzed for domoic acid as a result of the observed elevated abundance of *Pseudo-nitzschia* in this region. None of the samples analyzed contained detectable levels of DA.

For Information on our Volunteer Field Sampling Program Please Call:

(510) 540-3423

Distribution of Shellfish Biotoxins

Northern California



Northern California Summary:

Paralytic Shellfish Poisoning (PSP):

PSP toxicity was not detected at any northern California site during June.

Domoic Acid (DA):

Shellfish samples from the Santa Cruz area were analyzed for domoic acid as a result of the observed elevated abundance of *Pseudo-nitzschia* in Monterey Bay. DA toxicity was not detected in any samples from this area.

The Marine Biotoxin Monitoring and Control Program is a state-wide effort involving a consortium of volunteer participants. The shellfish sampling and analysis element of this program is intended to provide an early warning of shellfish toxicity by routinely assessing coastal resources for the presence of paralytic shellfish poisoning (PSP) toxins.

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ENVIRONMENTAL MANAGEMENT BRANCH
Marine Biotoxin Monitoring and Control Program

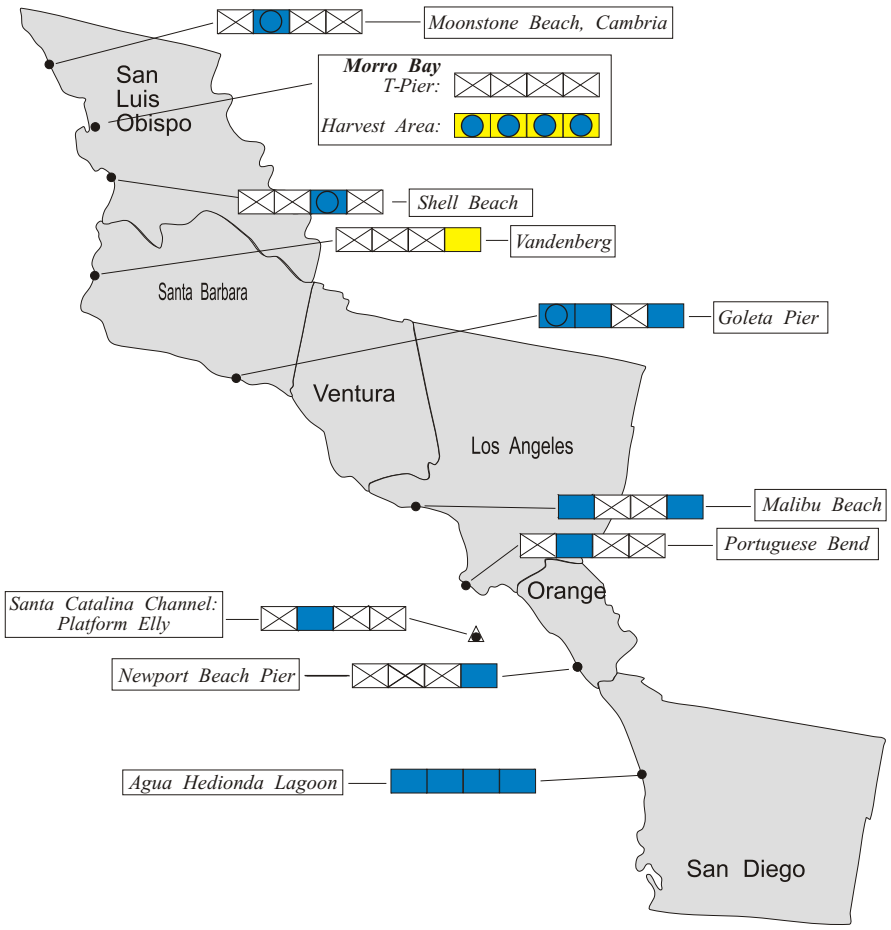
SHELLFISH BIOTOXIN MONTHLY REPORT

July 2001

Technical Report No. 01-22

Distribution of Shellfish Biotoxins

Southern California



KEY FOR SHELLFISH BIOTOXIN DATA

Week:	1	2	3	4
PSP Range: (ug/100 g)	no sample	not detected	< 80[1]	≥80
DA Range: (ppm)	no sample	not detected	< 20[2]	≥20

[1]PSP Alert Level [2]DA Alert Level
● = Single Site ◉ = Multiple Sites ▲ = Offshore Site

Source: DHS Marine Biotoxin Monitoring and Control Program, July 2001.

INTRODUCTION:

Please note the following conventions: (i) All data are for mussel samples, unless otherwise noted; (ii) All samples are analyzed for PSP toxins; domoic acid (DA) analyses are performed as needed (i.e., on the basis of detected blooms of the diatoms that produce DA). Please refer to the figure key for an explanation of the symbols used for the time of month of sample collection and the toxicity range.

Southern California Summary:

Paralytic Shellfish Poisoning (PSP): PSP toxins were detected in shellfish samples from two southern California sites in July. Mussels and oysters from Morro Bay (San Luis Obispo County) and mussels from Vandenberg (Santa Barbara County) contained low levels of PSP toxins. This low toxicity persisted throughout the month inside Morro Bay and was associated with observations of the toxin producing dinoflagellate *Alexandrium*.

Domoic Acid (DA):

Shellfish from San Luis Obispo and Santa Barbara sites were analyzed for domoic acid as a result of the observed elevated abundance of *Pseudo-nitzschia* in this region. None of the samples analyzed by the DHS Food and Drug lab contained detectable levels of DA.

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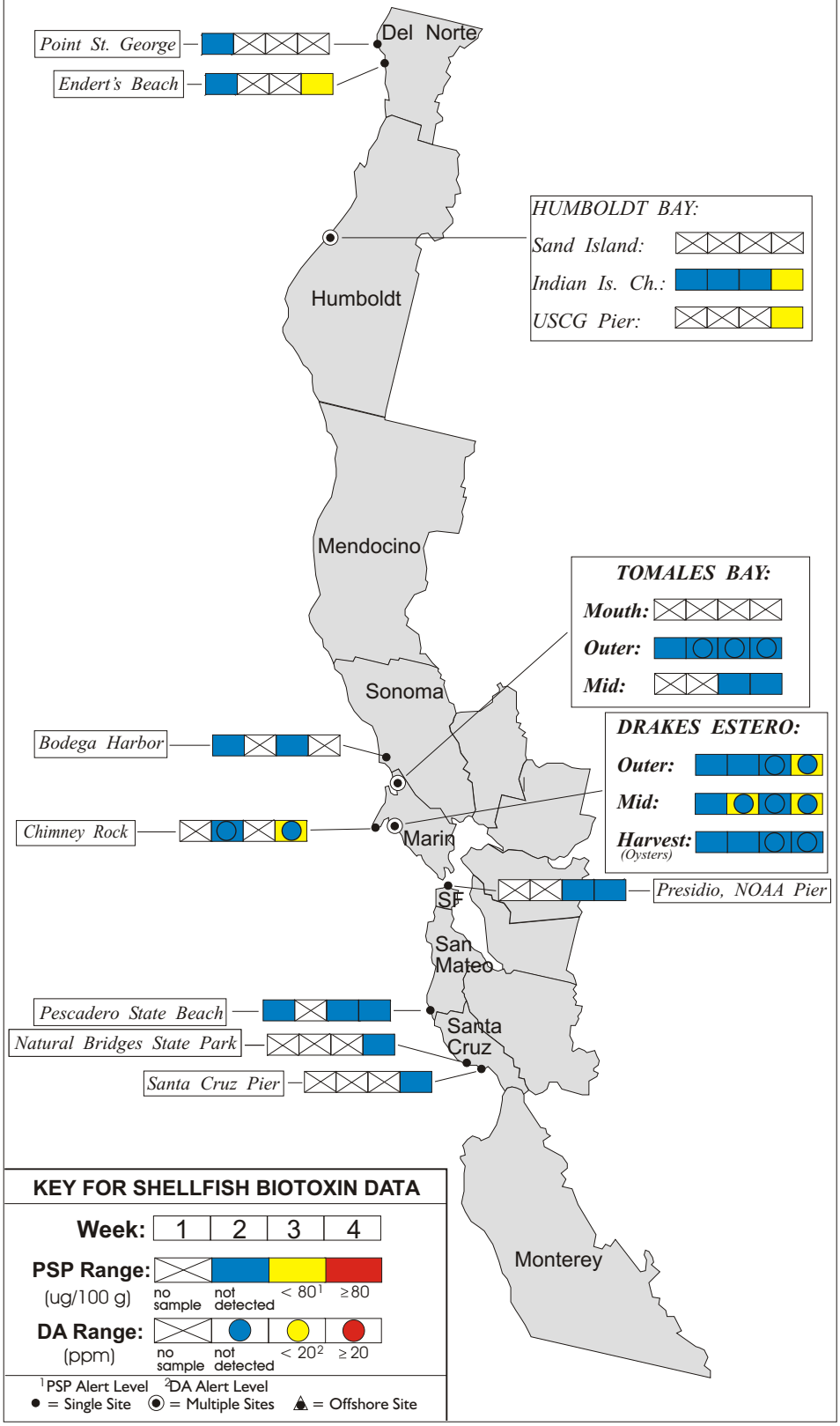
(510) 540-3423

Distribution of Shellfish Biotoxins

Northern California



Northern California Summary:

Paralytic Shellfish Poisoning (PSP):

PSP toxicity was detected at several northern California sites during July. Low levels of PSP toxins were detected in mussels from Del Norte, Humboldt, and Marin counties. Toxicity was first detected inside Drakes Estero during the second week of July. By the last week of the month toxicity was detected in mussels from the other locations mentioned above.

Domoic Acid (DA):

Shellfish samples from several Marin County sites were analyzed for domoic acid as a result of the observed elevated abundance of *Pseudo-nitzschia* throughout this region. DA was not detected in any samples during July.

The Marine Biotoxin Monitoring and Control Program is a state-wide effort involving a consortium of volunteer participants. The shellfish sampling and analysis element of this program is intended to provide an early warning of shellfish toxicity by routinely assessing coastal resources for the presence of paralytic shellfish poisoning (PSP) toxins.

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ENVIRONMENTAL MANAGEMENT BRANCH
Marine Biotoxin Monitoring and Control Program

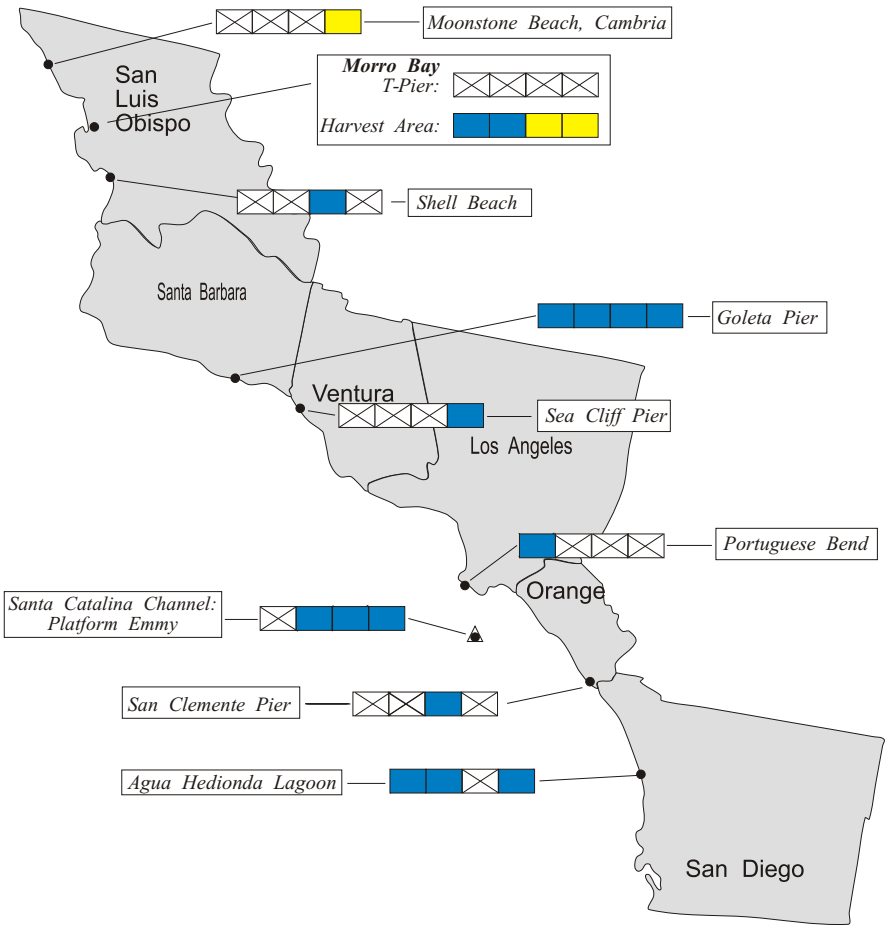
SHELLFISH BIOTOXIN MONTHLY REPORT

August 2001

Technical Report No. 01-24

Distribution of Shellfish Biotoxins

Southern California



KEY FOR SHELLFISH BIOTOXIN DATA

	Week: 1	2	3	4
PSP Range: (ug/100 g)	no sample	not detected	< 80[1]	≥ 80
DA Range: (ppm)	no sample	not detected	< 20[2]	≥ 20

[1] PSP Alert Level [2] DA Alert Level
● = Single Site ◉ = Multiple Sites ▲ = Offshore Site

Source: DHS Marine Biotoxin Monitoring and Control Program, August 2001.

INTRODUCTION:

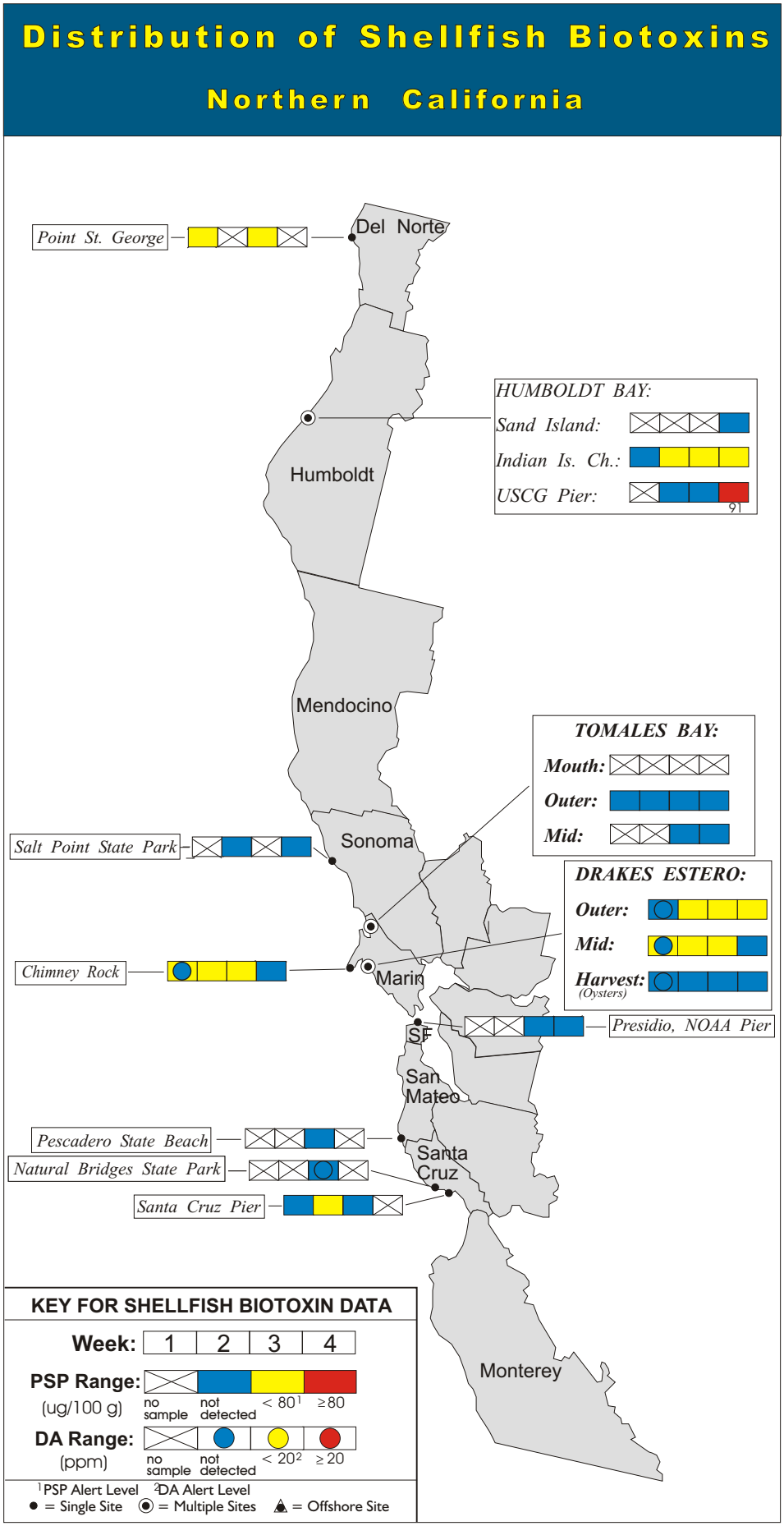
Please note the following conventions: (i) All data are for mussel samples, unless otherwise noted; (ii) All samples are analyzed for PSP toxins; domoic acid (DA) analyses are performed as needed (i.e., on the basis of detected blooms of the diatoms that produce DA). Please refer to the figure key for an explanation of the symbols used for the time of month of sample collection and the toxicity range.

Southern California Summary:

Paralytic Shellfish Poisoning (PSP): PSP toxins were detected in shellfish samples from two southern California sites in August. Mussels from Morro Bay and Cambria (San Luis Obispo County) contained low levels of PSP toxins in the latter part of the month. As with the low levels of toxicity detected in Morro Bay during July, the toxicity detected during August was preceeded by observations of the toxin producing dinoflagellate *Alexandrium*.

For Information on our Volunteer Field Sampling Program Please Call:

(510) 540-3423



Northern California Summary:

Paralytic Shellfish Poisoning (PSP):

PSP toxicity was detected at several northern California sites during August, from Santa Cruz to Del Norte counties. The low levels of PSP toxins detected in mussels from Del Norte and Humboldt counties persisted into August. A sample from the U.S. Coast Guard pier just inside Humboldt Bay exceeding the alert level by August 22 (91 ug). The low levels of PSP toxins detected along the Marin coast also persisted through most of August. Although the alert level was not exceeded at the Marin sites, toxin concentrations reached 61 ug in Drakes Bay (August 13) and 72 ug inside Drakes Estero (August 16).

Domoic Acid (DA):

Shellfish samples from several Marin County sites and one location in Santa Cruz were analyzed for domoic acid as a result of the observed elevated abundance of *Pseudo-nitzschia* throughout this region. DA was not detected in any samples during August.

The Marine Biotoxin Monitoring and Control Program is a state-wide effort involving a consortium of volunteer participants. The shellfish sampling and analysis element of this program is intended to provide an early warning of shellfish toxicity by routinely assessing coastal resources for the presence of paralytic shellfish poisoning (PSP) toxins.

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ENVIRONMENTAL MANAGEMENT BRANCH
Marine Biotoxin Monitoring and Control Program

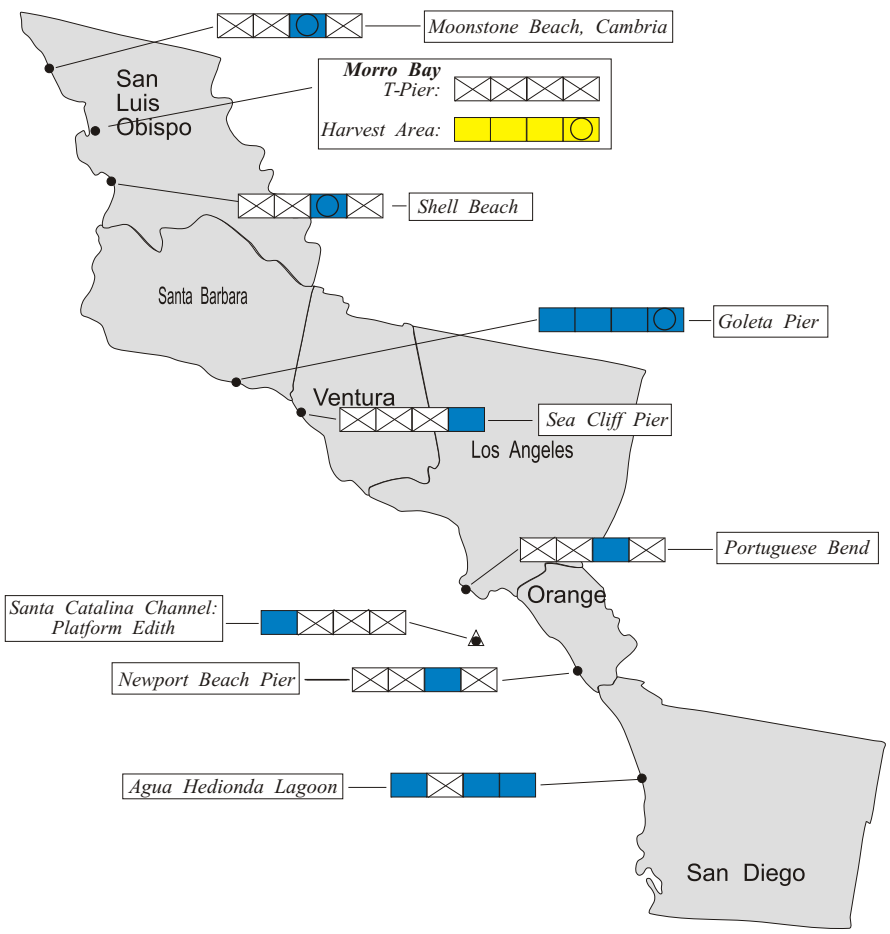
SHELLFISH BIOTOXIN MONTHLY REPORT

September 2001

Technical Report No. 01-26

Distribution of Shellfish Biotoxins

Southern California



KEY FOR SHELLFISH BIOTOXIN DATA

Week:	1	2	3	4
PSP Range: (ug/100 g)	no sample	not detected	< 80[1]	≥80
DA Range: (ppm)	no sample	not detected	< 20[2]	≥20

[1]PSP Alert Level [2]DA Alert Level
● = Single Site ◉ = Multiple Sites ▲ = Offshore Site

Source: DHS Marine Biotoxin Monitoring and Control Program, September 2001.

INTRODUCTION:

Please note the following conventions: (i) All data are for mussel samples, unless otherwise noted; (ii) All samples are analyzed for PSP toxins; domoic acid (DA) analyses are performed as needed (i.e., on the basis of detected blooms of the diatoms that produce DA). Please refer to the figure key for an explanation of the symbols used for the time of month of sample collection and the toxicity range.

Southern California Summary:

Paralytic Shellfish Poisoning (PSP): PSP toxins were detected in shellfish samples from Morro Bay (San Luis Obispo County) throughout the month of September.

Domoic Acid (DA):

Domoic acid was detected in shellfish samples from Morro Bay during the last week in September. Mussels and oysters from inside Morro Bay contained 7.3 ppm and 1.0 ppm DA, respectively.

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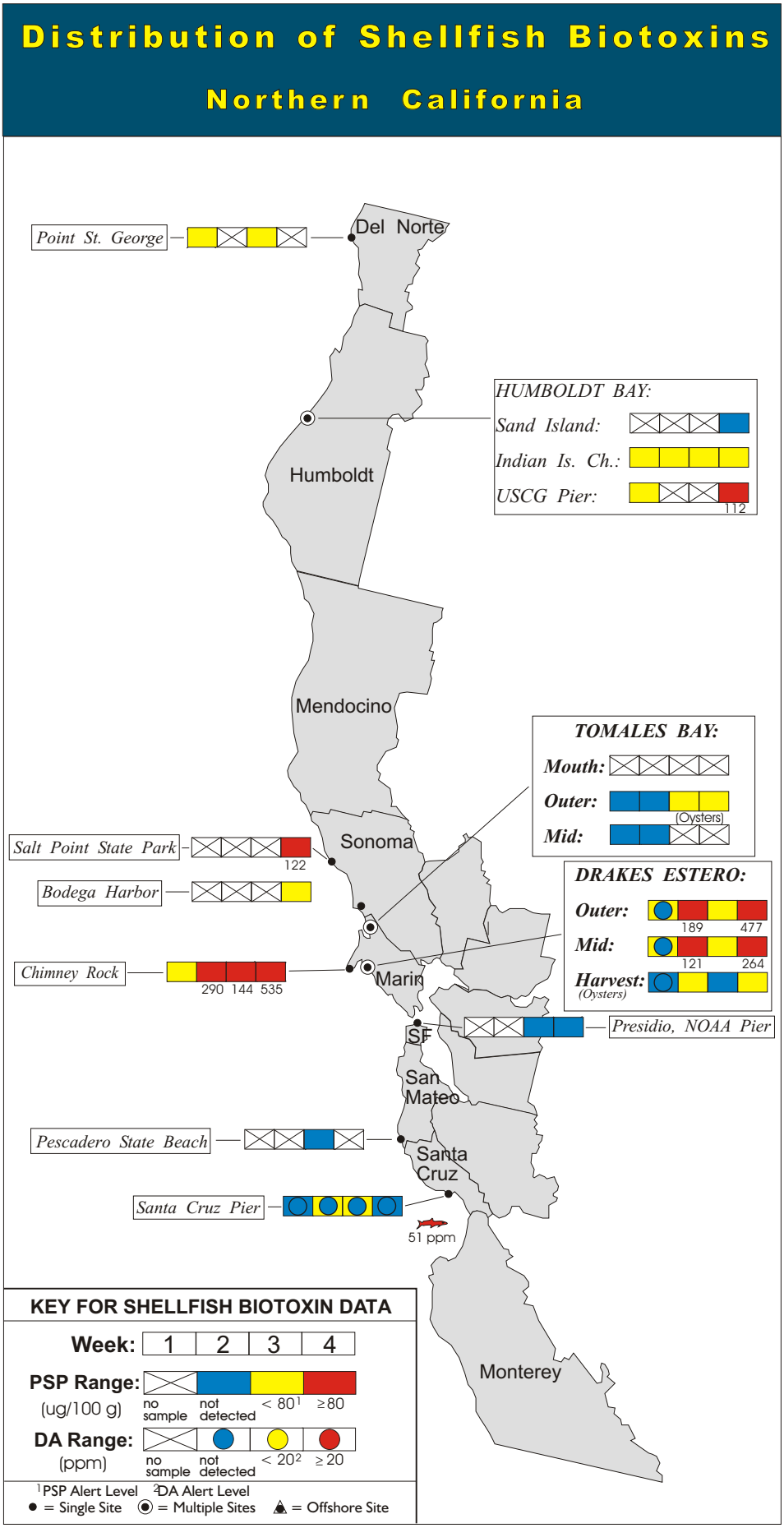
(510) 540-3423



Northern California Summary:

Paralytic Shellfish Poisoning (PSP):

PSP toxin levels increased dramatically at several sites along the northern California coast during September. By the second week of September PSP toxin concentrations had increased above the alert level at sites along the Marin coast. The highest concentrations were observed during the last week of the month. The elevated level of PSP toxins detected in Humboldt Bay in late August reoccurred at the end of September (112 ug; September 25).

Domoic Acid (DA):

Shellfish samples from Santa Cruz did not contain detectable levels of domoic acid despite the observed elevated abundance of *Pseudo-nitzschia* throughout this region. The DHS Food and Drug Branch sampled sardines used for bait and detected DA above the alert level in one sample (51 ppm).

The Marine Biotoxin Monitoring and Control Program is a state-wide effort involving a consortium of volunteer participants. The shellfish sampling and analysis element of this program is intended to provide an early warning of shellfish toxicity by routinely assessing coastal resources for the presence of paralytic shellfish poisoning (PSP) toxins.

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ENVIRONMENTAL MANAGEMENT BRANCH
Marine Biotoxin Monitoring and Control Program

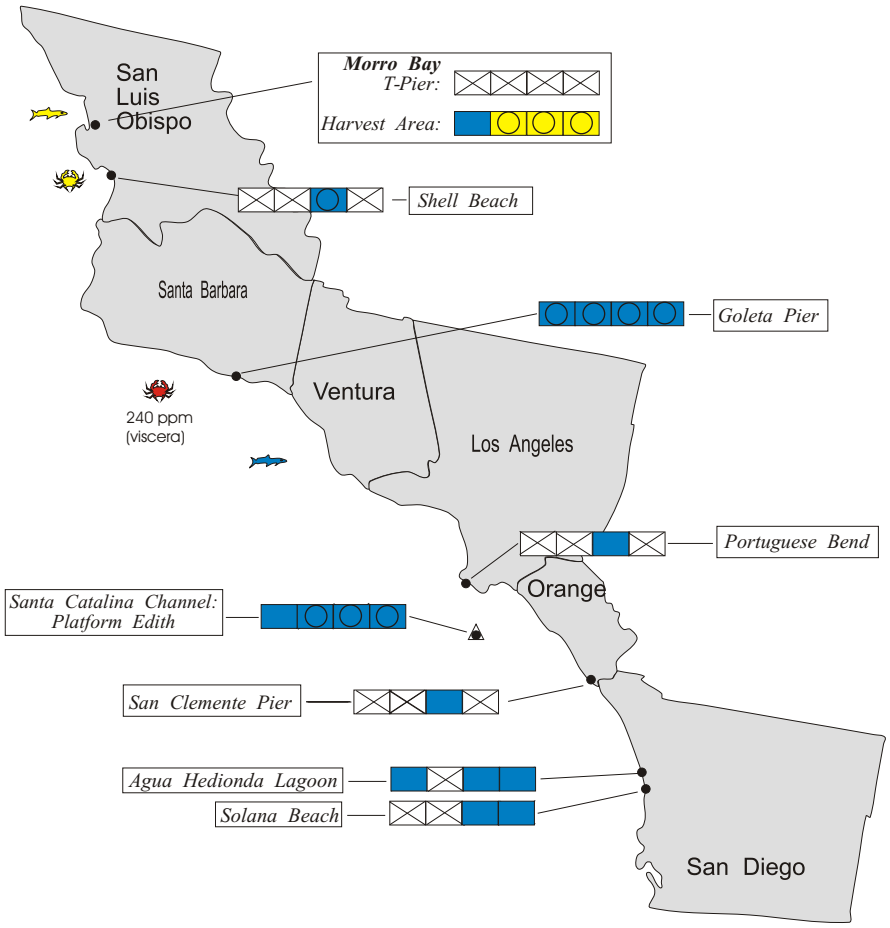
SHELLFISH BIOTOXIN MONTHLY REPORT

October 2001

Technical Report No. 01-28

Distribution of Shellfish Biotoxins

Southern California



KEY FOR SHELLFISH BIOTOXIN DATA

Week: 1 2 3 4

PSP Range: (ug/100 g) — no sample; not detected; < 80[1]; ≥80

DA Range: (ppm) — no sample; not detected; < 20[2]; ≥ 20

[1]PSP Alert Level [2]DA Alert Level
● = Single Site ◉ = Multiple Sites ▲ = Offshore Site

Source: DHS Marine Biotoxin Monitoring and Control Program, October 2001.

INTRODUCTION:

Please note the following conventions: (i) All data are for mussel samples, unless otherwise noted; (ii) All samples are analyzed for PSP toxins; domoic acid (DA) analyses are performed as needed (i.e., on the basis of detected blooms of the diatoms that produce DA). Please refer to the figure key for an explanation of the symbols used for the time of month of sample collection and the toxicity range.

Southern California Summary:

Paralytic Shellfish Poisoning (PSP): The low concentrations of PSP toxins detected in shellfish samples from Morro Bay (San Luis Obispo County) in September continued through the end of October.

Domoic Acid (DA):

Domoic acid continued to be present in shellfish samples from Morro Bay during October. The highest concentration of DA in mussels and oysters from inside Morro Bay was 3.2 ppm and 4.2 ppm, respectively.

The Department's Food and Drug Branch conducted extensive sampling of sardines, anchovies, and crab from commercial fisheries. Elevated concentrations of DA were detected in the viscera of crabs caught offshore of Santa Barbara. Lower levels of DA were found in sardines and rock crabs caught offshore of San Luis Obispo.

For Information on our Volunteer Field Sampling Program Please Call:

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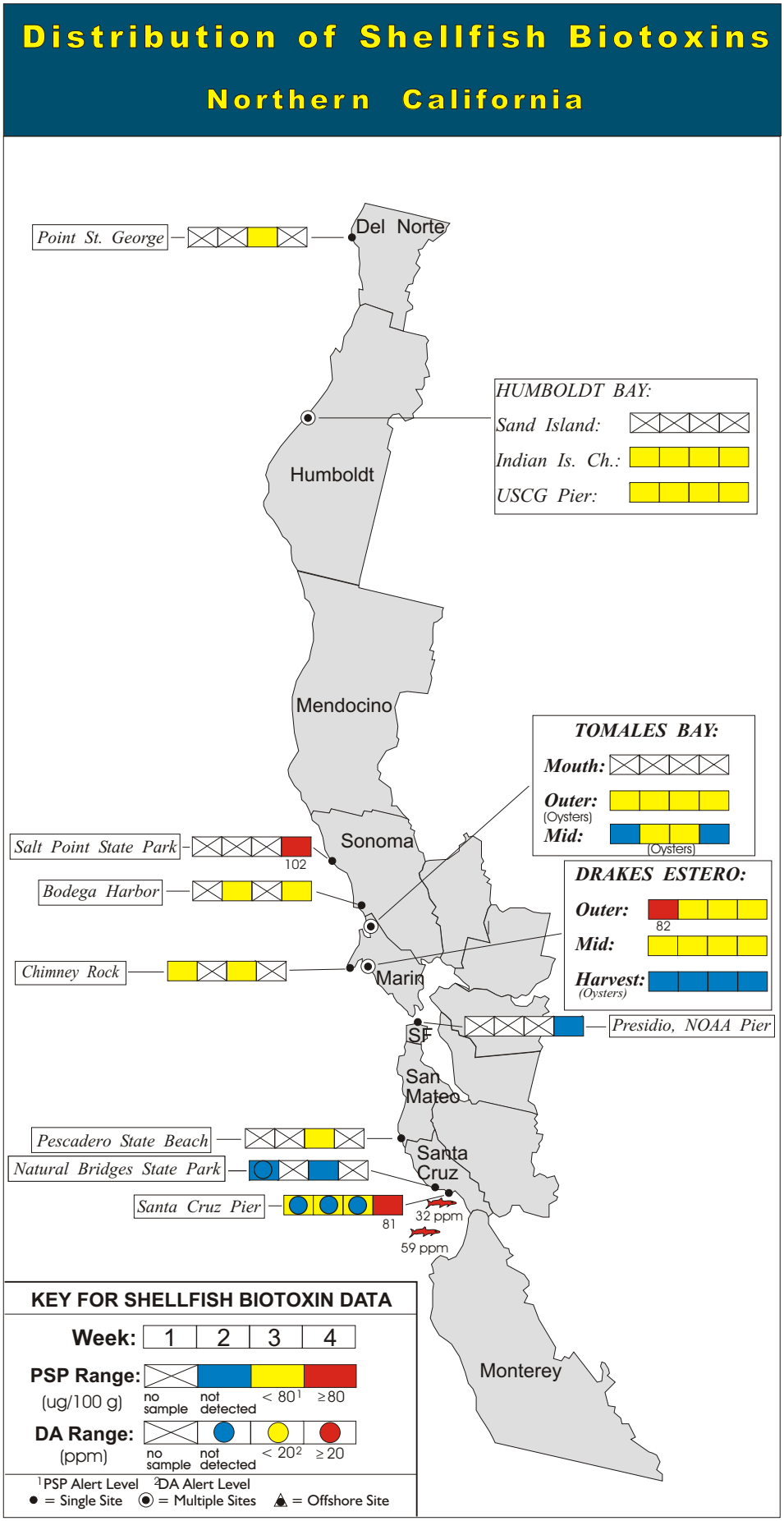

Northern California Summary:

Paralytic Shellfish Poisoning (PSP):

PSP toxin levels decreased in comparison to September's observations but persisted at low levels along the entire northern California coast. Elevated concentrations of PSP toxins were detected at sites along the coast of Sonoma and Santa Cruz counties. The highest detected toxin concentration was in mussels from Salt Point State Park (102 ug/100 g).

Domoic Acid (DA):

The ongoing bloom of *Pseudo-nitzschia* was cause for continued domoic acid monitoring in the Monterey Bay region. Shellfish samples from Santa Cruz did not contain detectable levels of domoic acid despite the observed elevated abundance of this diatom throughout this region.

The Department's Food and Drug Branch sampled commercially caught sardines used for bait and detected DA above the alert level in several samples. The highest concentration of DA detected was 51 ppm. Many other sardine samples contained low or nondetectable concentrations of this toxin throughout the month.

The Marine Biotoxin Monitoring and Control Program is a state-wide effort involving a consortium of volunteer participants. The shellfish sampling and analysis element of this program is intended to provide an early warning of shellfish toxicity by routinely assessing coastal resources for the presence of paralytic shellfish poisoning (PSP) toxins.

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ENVIRONMENTAL MANAGEMENT BRANCH
Marine Biotoxin Monitoring and Control Program

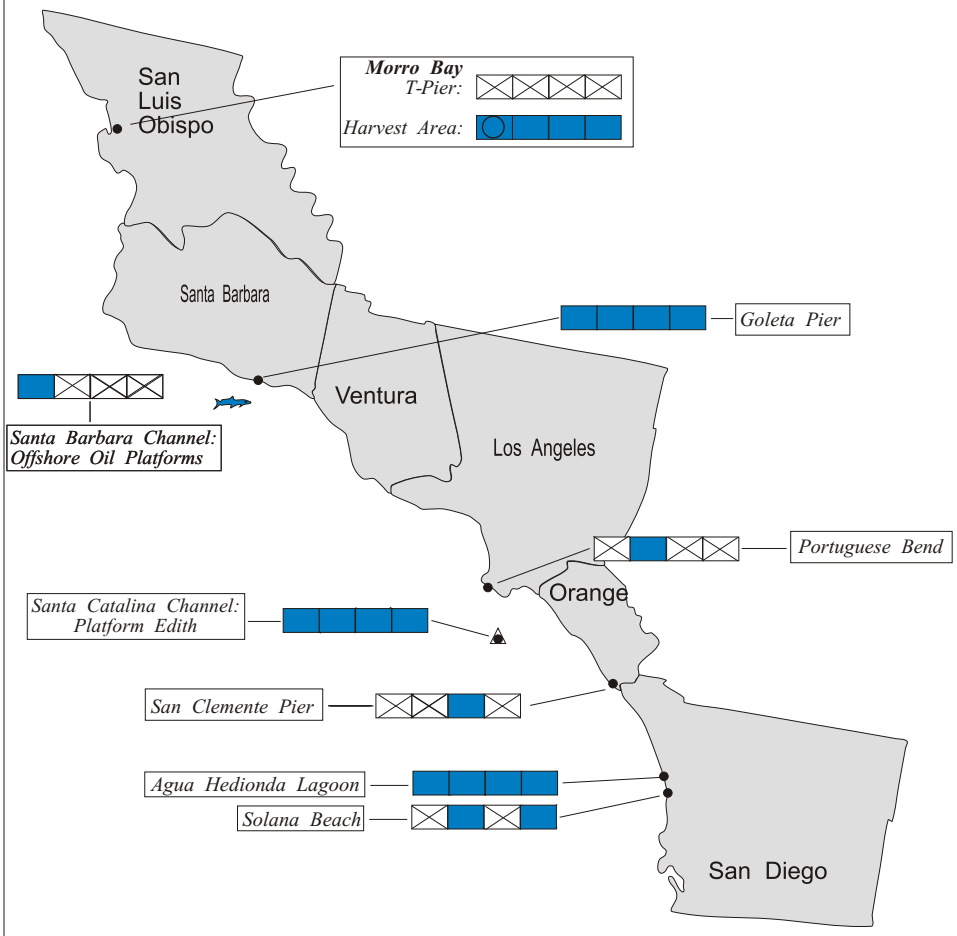
SHELLFISH BIOTOXIN MONTHLY REPORT

November 2001

Technical Report No. 01-30

Distribution of Shellfish Biotoxins

Southern California



KEY FOR SHELLFISH BIOTOXIN DATA

	Week: 1	2	3	4
PSP Range: (ug/100 g)	no sample	not detected	< 80[1]	≥ 80
DA Range: (ppm)	no sample	not detected	< 20[2]	≥ 20

[1] PSP Alert Level [2] DA Alert Level
● = Single Site ◉ = Multiple Sites ▲ = Offshore Site

Source: DHS Marine Biotoxin Monitoring and Control Program, November 2001.

INTRODUCTION:

Please note the following conventions: (i) All data are for mussel samples, unless otherwise noted; (ii) All samples are analyzed for PSP toxins; domoic acid (DA) analyses are performed as needed (i.e., on the basis of detected blooms of the diatoms that produce DA). Please refer to the figure key for an explanation of the symbols used for the time of month of sample collection and the toxicity range.

Southern California Summary:

Paralytic Shellfish Poisoning (PSP): The low concentrations of PSP toxins detected in shellfish samples from Morro Bay (San Luis Obispo County) in October decreased below detectable levels by November.

Domoic Acid (DA):

Domoic acid was absent in samples of shellfish from Morro Bay and sardines from Santa Barbara.

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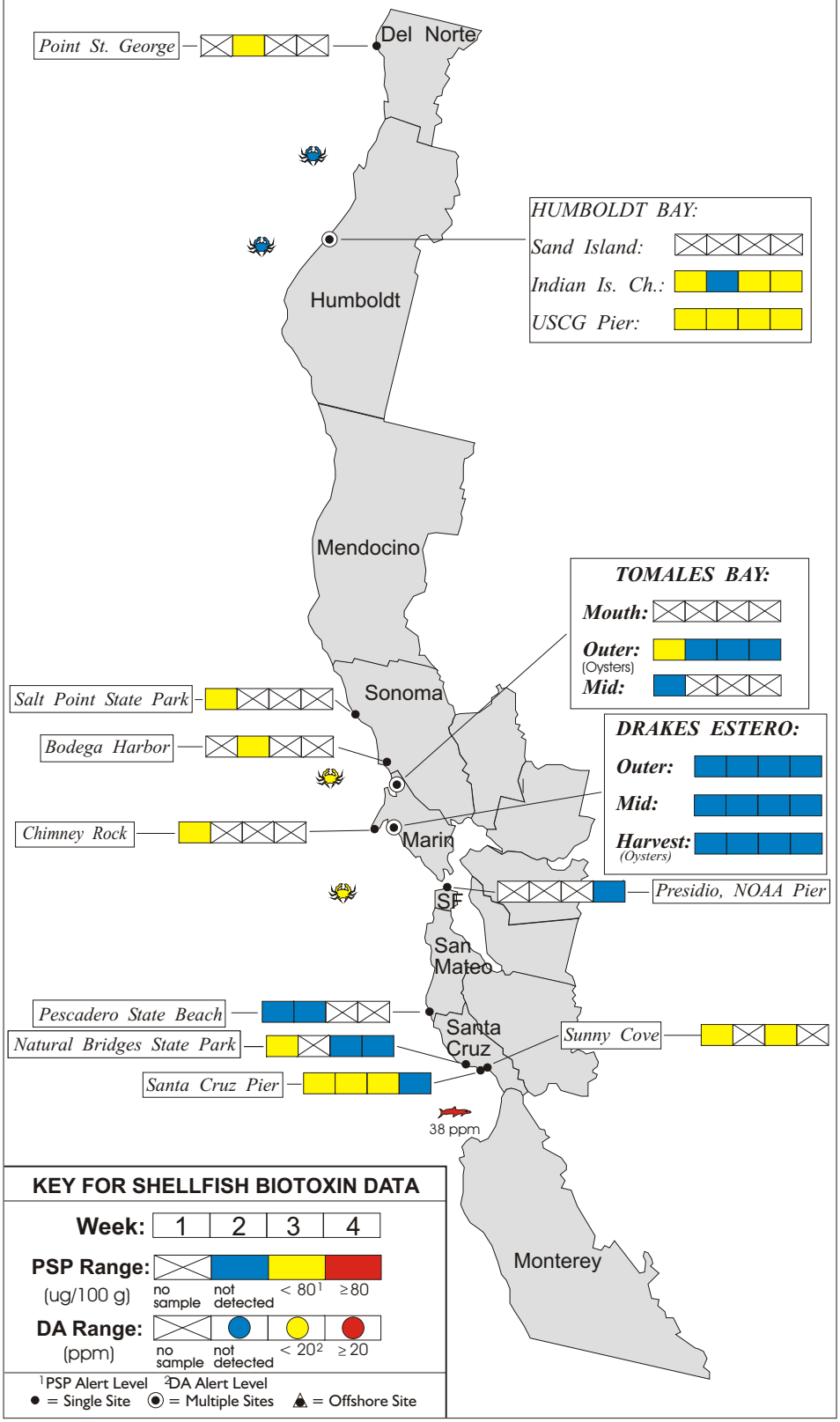
(510) 540-3423

Distribution of Shellfish Biotoxins

Northern California



Northern California Summary:

Paralytic Shellfish Poisoning (PSP):

PSP toxin levels persisted at low levels along the entire northern California coast throughout November.

Domoic Acid (DA):

The Department's Food and Drug Branch sampled commercially caught sardines used for bait and detected DA above the alert level in several samples. The highest detected concentration of domoic acid was 51 ppm. Many other sardine samples contained low or nondetectable concentrations of this toxin throughout the month.

The Marine Biotoxin Monitoring and Control Program is a state-wide effort involving a consortium of volunteer participants. The shellfish sampling and analysis element of this program is intended to provide an early warning of shellfish toxicity by routinely assessing coastal resources for the presence of paralytic shellfish poisoning (PSP) toxins.

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ENVIRONMENTAL MANAGEMENT BRANCH
Marine Biotoxin Monitoring and Control Program

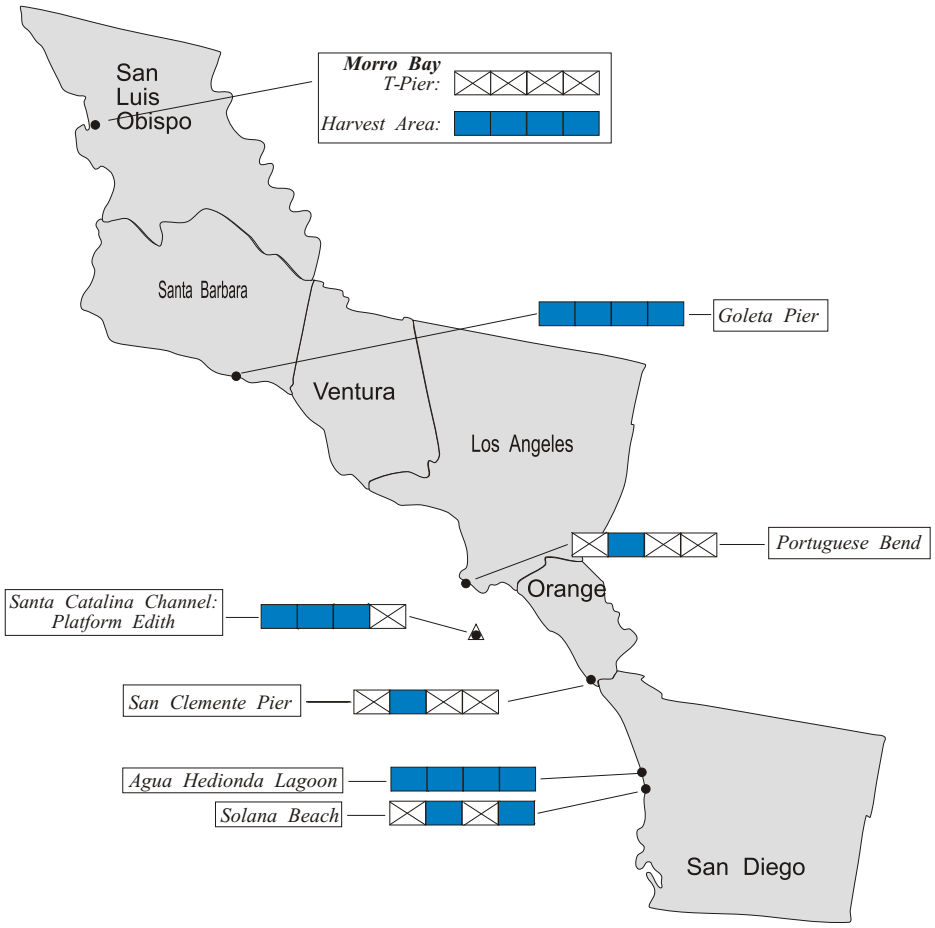
SHELLFISH BIOTOXIN MONTHLY REPORT

December 2001

Technical Report No. 01-32

Distribution of Shellfish Biotoxins

Southern California



KEY FOR SHELLFISH BIOTOXIN DATA

Week: 1 2 3 4

PSP Range: (ug/100 g) — no sample; not detected; < 80[1]; ≥ 80

DA Range: (ppm) — no sample; not detected; < 20[2]; ≥ 20

[1]PSP Alert Level [2]DA Alert Level
● = Single Site ◉ = Multiple Sites ▲ = Offshore Site

Source: DHS Marine Biotoxin Monitoring and Control Program, December 2001.

INTRODUCTION:

Please note the following conventions: (i) All data are for mussel samples, unless otherwise noted; (ii) All samples are analyzed for PSP toxins; domoic acid (DA) analyses are performed as needed (i.e., on the basis of detected blooms of the diatoms that produce DA). Please refer to the figure key for an explanation of the symbols used for the time of month of sample collection and the toxicity range.

Southern California Summary:

Paralytic Shellfish Poisoning (PSP): PSP toxins were not detected in any shellfish samples from southern California sites during December.

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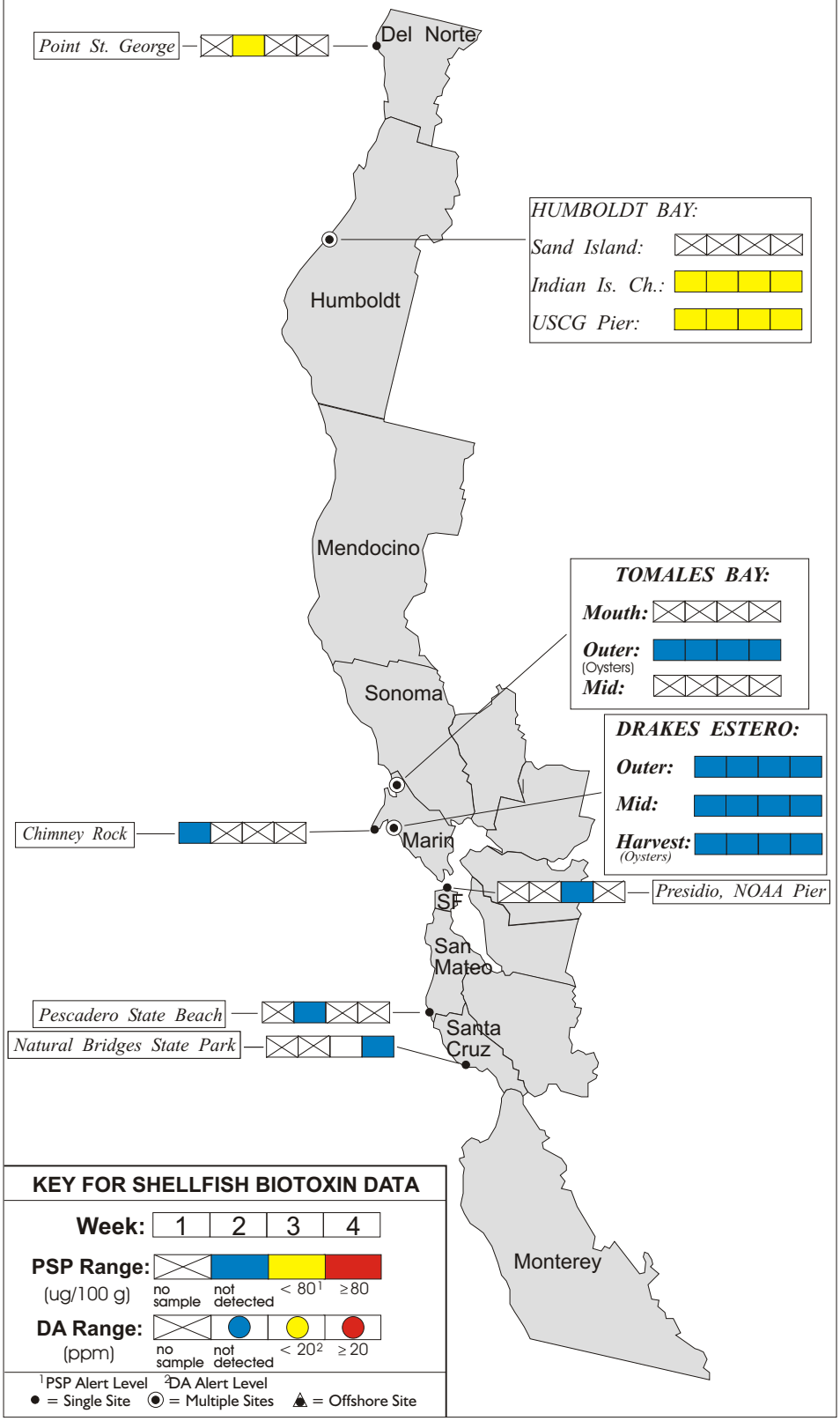
(510) 540-3423

Distribution of Shellfish Biotoxins

Northern California



Northern California Summary:

Paralytic Shellfish Poisoning (PSP):

PSP toxin levels persisted at low levels at sites in Humboldt and Del Norte counties during December. Levels of toxin just above the detection limit were detected at two stations inside Humboldt Bay throughout the month. The maximum concentration observed in December was 50 ug in mussels from Point St. George.

The Marine Biotoxin Monitoring and Control Program is a state-wide effort involving a consortium of volunteer participants. The shellfish sampling and analysis element of this program is intended to provide an early warning of shellfish toxicity by routinely assessing coastal resources for the presence of paralytic shellfish poisoning (PSP) toxins.

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APPENDIX B.

Monthly lists of program participants submitting shellfish samples for PSP toxin assay during 2001.

Appendix B-1. California Marine Biotoxin Monitoring and Control Program participants submitting shellfish samples during January 2001.

COUNTY	AGENCY	SAMPLES
Del Norte	Del Norte County Health Department	1
Humboldt	Coast Seafood Company	5
Mendocino	None Submitted	
Sonoma	None Submitted	
Marin	Cove Mussel Company	2
	Hog Island Oyster Company	2
	Johnson Oyster Company	20
	Marin Oyster Company	5
San Francisco	San Francisco County Health Department	1
San Mateo	None Submitted	
Santa Cruz	Santa Cruz County Environmental Health Department	1
Monterey	None Submitted	
San Luis Obispo	Williams Shellfish Company	8
Santa Barbara	U.C. Santa Barbara Marine Science Institute	6
Ventura	None Submitted	
Los Angeles	Los Angeles County Health Department	2
Orange	Orange County Health Care Agency	1
	Ecomar, Inc.	3
San Diego	Carlsbad Aquafarm, Inc.	4
	CDHS Volunteer (Paul Sims)	2

Appendix B-2. California Marine Biotoxin Monitoring and Control Program participants submitting shellfish samples during February 2001.

COUNTY	AGENCY	SAMPLES
Del Norte	Del Norte County Health Department	1
Humboldt	Coast Seafood Company	4
Mendocino	None Submitted	
Sonoma	None Submitted	
Marin	Cove Mussel Company	1
	Hog Island Oyster Company	1
	Johnson Oyster Company	16
	Marin Oyster Company	4
San Francisco	San Francisco County Health Department	1
San Mateo	San Mateo County Environmental Health Department	1
Santa Cruz	None Submitted	
Monterey	None Submitted	
San Luis Obispo	Williams Shellfish Company	8
Santa Barbara	U.C. Santa Barbara Marine Science Institute	6
Ventura	None Submitted	
Los Angeles	Los Angeles County Health Department	1
Orange	Orange County Health Care Agency	1
	Ecomar, Inc.	2
San Diego	Carlsbad Aquafarm, Inc.	3
	CDHS Volunteer (Paul Sims)	2

Appendix B-3. California Marine Biotoxin Monitoring and Control Program participants submitting shellfish samples during March 2001.

COUNTY	AGENCY	SAMPLES
Del Norte	Del Norte County Health Department	1
Humboldt	Coast Seafood Company	4
	Humboldt County Environmental Health Department	1
Mendocino	None Submitted	
Sonoma	None Submitted	
Marin	Cove Mussel Company	1
	CDHS Marine Biotoxin Program	1
	Hog Island Oyster Company	2
	Johnson Oyster Company	16
	Marin Oyster Company	4
San Francisco	None Submitted	
San Mateo	San Mateo County Environmental Health Department	2
Santa Cruz	Santa Cruz County Environmental Health Department	1
Monterey	None Submitted	
San Luis Obispo	Williams Shellfish Company	8
Santa Barbara	U.C. Santa Barbara Marine Science Institute	4
Ventura	None Submitted	
Los Angeles	Los Angeles County Health Department	1
Orange	Orange County Health Care Agency	1
	Ecomar, Inc.	1
San Diego	Carlsbad Aquafarm, Inc.	4
	CDHS Volunteer (Paul Sims)	2

Appendix B-4. California Marine Biotoxin Monitoring and Control Program participants submitting shellfish samples during April 2001.

COUNTY	AGENCY	SAMPLES
Del Norte	Del Norte County Health Department	1
Humboldt	Coast Seafood Company	4
Mendocino	None Submitted	
Sonoma	California Department of Parks and Recreation	4
Marin	Cove Mussel Company	1
	CDHS Marine Biotoxin Program	2
	Hog Island Oyster Company	2
	Johnson Oyster Company	16
	Marin Oyster Company	4
San Francisco	San Francisco County Health Department	1
San Mateo	San Mateo County Environmental Health Department	2
Santa Cruz	None Submitted	
Monterey	None Submitted	
San Luis Obispo	Williams Shellfish Company	10
Santa Barbara	U.C. Santa Barbara Marine Science Institute	4
	California Department of Parks and Recreation	1
Ventura	Ventura County Environmental Health Department	1
Los Angeles	Los Angeles County Health Department	1
Orange	Orange County Health Care Agency	1
	Ecomar, Inc.	2
San Diego	Carlsbad Aquafarm, Inc.	3
	CDHS Volunteer (Paul Sims)	1

Appendix B-5. California Marine Biotoxin Monitoring and Control Program participants submitting shellfish samples during May 2001.

COUNTY	AGENCY	SAMPLES
Del Norte	Del Norte County Health Department	2
Humboldt	Coast Seafood Company	5
Mendocino	None Submitted	
Sonoma	Sonoma County Public Health Department	2
Marin	Cove Mussel Company	4
	CDHS Marine Biotoxin Program	2
	Hog Island Oyster Company	3
	Johnson Oyster Company	20
	Marin Oyster Company	5
San Francisco	San Francisco County Health Department	2
San Mateo	San Mateo County Environmental Health Department	2
Santa Cruz	Santa Cruz County Environmental Health Department	2
Monterey	None Submitted	
San Luis Obispo	Williams Shellfish Company	8
	San Luis Obispo County Environmental Health Department	2
Santa Barbara	U.C. Santa Barbara Marine Science Institute	5
	Vandenberg Air Force Base, Environmental Health Services	1
Ventura	Ventura County Health Department	1
Los Angeles	Los Angeles County Health Department	3
Orange	Orange County Health Care Agency	1
	Ecomar, Inc.	2
San Diego	Carlsbad Aquafarm, Inc.	5

Appendix B-6. California Marine Biotoxin Monitoring and Control Program participants submitting shellfish samples during June 2001.

COUNTY	AGENCY	SAMPLES
Del Norte	Del Norte County Health Department	1
Humboldt	Coast Seafood Company	4
	Humboldt County Environmental Health Department	1
Mendocino	None Submitted	
Sonoma	California Department of Parks and Recreation	1
	Sonoma County Public Health Department	3
Marin	Cove Mussel Company	3
	CDHS Marine Biotoxin Program	2
	Hog Island Oyster Company	3
	Johnson Oyster Company	16
	Marin Oyster Company	4
San Francisco	San Francisco County Health Department	2
San Mateo	San Mateo County Environmental Health Department	2
Santa Cruz	Santa Cruz County Environmental Health Department	2
	University of California at Santa Cruz	1
Monterey	None Submitted	
San Luis Obispo	Williams Shellfish Company	8
	San Luis Obispo County Environmental Health Department	1
	CDHS Marine Biotoxin Program	2
Santa Barbara	U.C. Santa Barbara Marine Science Institute	4
	Vandenberg Air Force Base, Environmental Health Services	1
Ventura	Ventura County Environmental Health Department	1
Los Angeles	Los Angeles County Health Department	1
Orange	Orange County Health Care Agency	1
	Ecomar, Inc.	1
San Diego	Carlsbad Aquafarm, Inc.	2

Appendix B-7. California Marine Biotoxin Monitoring and Control Program participants submitting shellfish samples during July 2001.

COUNTY	AGENCY	SAMPLES
Del Norte	Del Norte County Health Department	2
Humboldt	Coast Seafood Company	8
Mendocino	None Submitted	
Sonoma	Sonoma County Public Health Department	2
Marin	Cove Mussel Company	2
	CDHS Marine Biotoxin Program	3
	Hog Island Oyster Company	3
	Johnson Oyster Company	24
	Marin Oyster Company	5
San Francisco	San Francisco County Health Department	2
San Mateo	San Mateo County Environmental Health Department	1
Santa Cruz	Santa Cruz County Environmental Health Department	1
	U.C. Santa Cruz	12
Monterey	None Submitted	
San Luis Obispo	Williams Shellfish Company	18
	San Luis Obispo County Health Department	2
Santa Barbara	U.C. Santa Barbara Marine Science Institute	3
	Vandenberg AFB Environmental Health Services	1
Ventura	None Submitted	
Los Angeles	Los Angeles County Health Department	3
Orange	Orange County Health Care Agency	1
	Ecomar, Inc.	1
San Diego	Carlsbad Aquafarm, Inc.	4

Appendix B-8. California Marine Biotoxin Monitoring and Control Program participants submitting shellfish samples during August 2001.

COUNTY	AGENCY	SAMPLES
Del Norte	Del Norte County Health Department	2
Humboldt	Coast Seafood Company	6
	Humboldt County Environmental Health Department	5
Mendocino	None Submitted	
Sonoma	Sonoma County Public Health Department	2
Marin	Cove Mussel Company	2
	CDHS Marine Biotoxin Program	5
	Hog Island Oyster Company	2
	Johnson Oyster Company	31
	Marin Oyster Company	4
San Francisco	San Francisco County Health Department	2
San Mateo	San Mateo County Environmental Health Department	1
Santa Cruz	Santa Cruz County Environmental Health Department	1
	U.C. Santa Cruz	3
Monterey	None Submitted	
San Luis Obispo	Williams Shellfish Company	8
	San Luis Obispo County Environmental Health Department	2
Santa Barbara	U.C. Santa Barbara Marine Science Institute	5
Ventura	Ventura County Health Department	1
Los Angeles	Los Angeles County Health Department	1
Orange	Orange County Health Care Agency	1
	Ecomar, Inc.	3
San Diego	Carlsbad Aquafarm, Inc.	3

Appendix B-9. California Marine Biotoxin Monitoring and Control Program participants submitting shellfish samples during September 2001.

COUNTY	AGENCY	SAMPLES
Del Norte	Del Norte County Health Department	2
Humboldt	Coast Seafood Company	9
Mendocino	None Submitted	
Sonoma	Sonoma County Public Health Department	2
Marin	Cove Mussel Company	3
	CDHS Marine Biotoxin Program	5
	Hog Island Oyster Company	4
	Johnson Oyster Company	32
	Marin Oyster Company	4
San Francisco	San Francisco County Health Department	2
San Mateo	San Mateo County Environmental Health Department	1
Santa Cruz	University of California at Santa Cruz	4
Monterey	None Submitted	
San Luis Obispo	Williams Shellfish Company	10
	San Luis Obispo County Environmental Health Department	2
Santa Barbara	U.C. Santa Barbara Marine Science Institute	4
Ventura	Ventura County Environmental Health Department	1
Los Angeles	Los Angeles County Health Department	1
Orange	Orange County Health Care Agency	1
	Ecomar, Inc.	1
San Diego	Carlsbad Aquafarm, Inc.	3

Appendix B-10. California Marine Biotoxin Monitoring and Control Program participants submitting shellfish samples during October 2001.

COUNTY	AGENCY	SAMPLES
Del Norte	Del Norte County Health Department	1
Humboldt	Coast Seafood Company	7
	Humboldt County Environmental Health Department	4
Mendocino	None Submitted	
Sonoma	Sonoma County Public Health Department	2
	California Department of Parks and Recreation	1
Marin	Cove Mussel Company	3
	CDHS Marine Biotoxin Program	2
	Hog Island Oyster Company	5
	Johnson Oyster Company	26
	Marin Oyster Company	7
	Point Reyes Oyster Company	2
San Francisco	San Francisco County Health Department	1
San Mateo	San Mateo County Environmental Health Department	1
Santa Cruz	Santa Cruz County Environmental Health Department	2
	U.C. Santa Cruz	6
Monterey	None Submitted	
San Luis Obispo	Williams Shellfish Company	8
	San Luis Obispo County Health Department	1
Santa Barbara	U.C. Santa Barbara Marine Science Institute	5
Ventura	None Submitted	
Los Angeles	Los Angeles County Health Department	1
Orange	Orange County Health Care Agency	1
	Ecomar, Inc.	4
San Diego	Carlsbad Aquafarm, Inc.	4
	CDHS Volunteer (Paul Sims)	2

Appendix B-11. California Marine Biotoxin Monitoring and Control Program participants submitting shellfish samples during November 2001.

COUNTY	AGENCY	SAMPLES
Del Norte	Del Norte County Health Department	1
Humboldt	Coast Seafood Company	5
	Humboldt County Environmental Health Department	3
Mendocino	None Submitted	
Sonoma	Sonoma County Public Health Department	1
	California Department of Parks and Recreation	1
Marin	Cove Mussel Company	1
	CDHS Marine Biotoxin Program	1
	Hog Island Oyster Company	2
	Johnson Oyster Company	16
	Marin Oyster Company	2
San Francisco	San Francisco County Health Department	1
San Mateo	San Mateo County Environmental Health Department	2
Santa Cruz	Santa Cruz County Environmental Health Department	7
	U.C. Santa Cruz	4
Monterey	None Submitted	
San Luis Obispo	Williams Shellfish Company	8
Santa Barbara	U.C. Santa Barbara Marine Science Institute	7
Ventura	None Submitted	
Los Angeles	Los Angeles County Health Department	1
Orange	Ecomar, Inc.	4
San Diego	Carlsbad Aquafarm, Inc.	4
	CDHS Volunteer (Paul Sims)	2

Appendix B-12. California Marine Biotoxin Monitoring and Control Program participants submitting shellfish samples during December 2001.

COUNTY	AGENCY	SAMPLES
Del Norte	Del Norte County Health Department	1
Humboldt	Coast Seafood Company	4
	Humboldt County Environmental Health Department	4
Mendocino	None Submitted	
Sonoma	None Submitted	
Marin	CDHS Marine Biotoxin Program	1
	Hog Island Oyster Company	1
	Johnson Oyster Company	16
	Marin Oyster Company	3
San Francisco	San Francisco County Health Department	1
San Mateo	San Mateo County Environmental Health Department	1
Santa Cruz	Santa Cruz County Environmental Health Department	1
Monterey	None Submitted	
San Luis Obispo	Williams Shellfish Company	8
Santa Barbara	U.C. Santa Barbara Marine Science Institute	4
Ventura	None Submitted	
Los Angeles	Los Angeles County Health Department	1
Orange	Orange County Health Care Agency	1
	Ecomar, Inc.	3
San Diego	Carlsbad Aquafarm, Inc.	4
	CDHS Volunteer (Paul Sims)	2

APPENDIX C.

Monthly maps of toxic phytoplankton distribution and sampling effort during 2001.

CALIFORNIA DEPARTMENT OF HEALTH SERVICES
2151 Berkeley Way, Berkeley CA 94704-1011

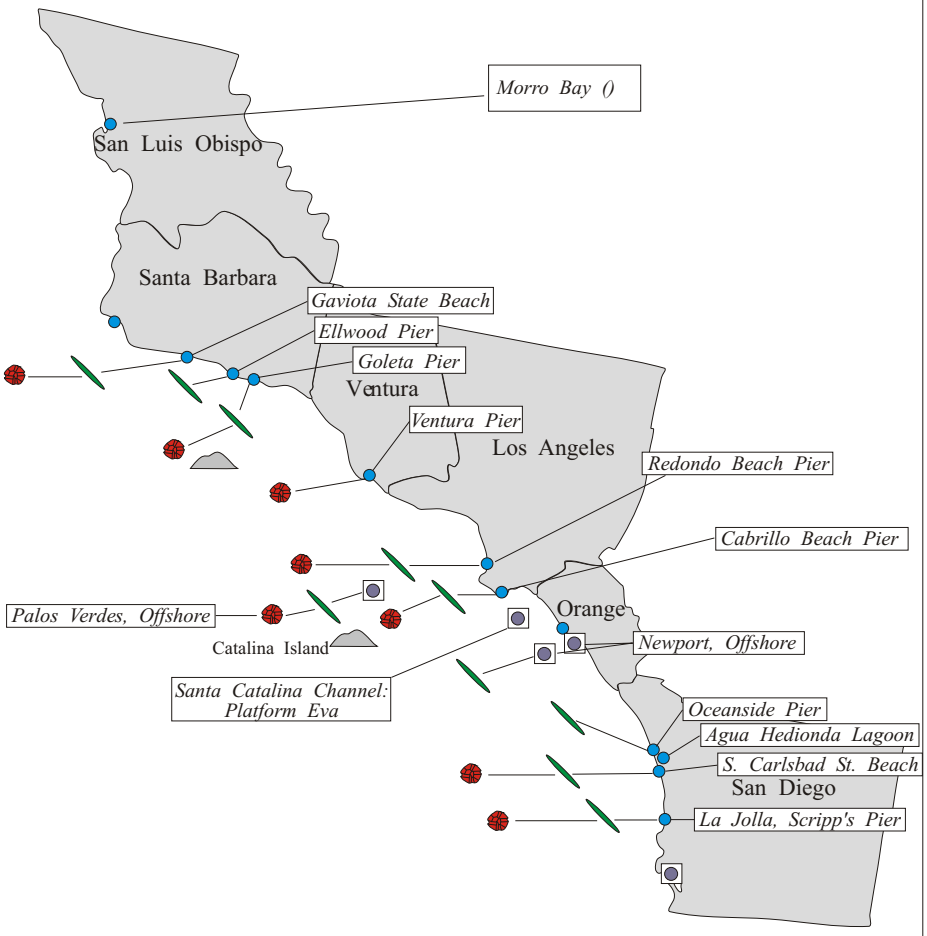
ENVIRONMENTAL MANAGEMENT BRANCH
Phytoplankton Monitoring Program

Phytoplankton Monthly Report

January 2001

Technical Report No. 01-07

Distribution of Toxin-Producing Phytoplankton
Southern California



Relative Abundance of Known Toxin Producers

Alexandrium Species

- Rare (less than 1%)
- Present (between 1% and 10%)
- Common (between 10% and 50%)
- Abundant (greater than 50%)

Pseudo-nitzschia Species

- Present (less than 10%)
- Common (between 10% and 50%)
- Abundant (greater than 50%)

MONTHLY SAMPLING STATIONS:

- Single Sampling Station
- Multiple Sampling Stations
- Offshore Sampling Station

For areas with multiple sampling stations, species abundance at each station is represented as follows:
(a,p) = Abundance for Alexandrium and Pseudo-nitzschia.
e.g., (c,p) = common, present; (a,-) = abundant, not observed

Southern California Summary:

Alexandrium catenella (Dinoflagellate that produces paralytic shellfish poisoning (PSP) toxins). Low numbers of *Alexandrium* were observed along much of the southern California coast during January.

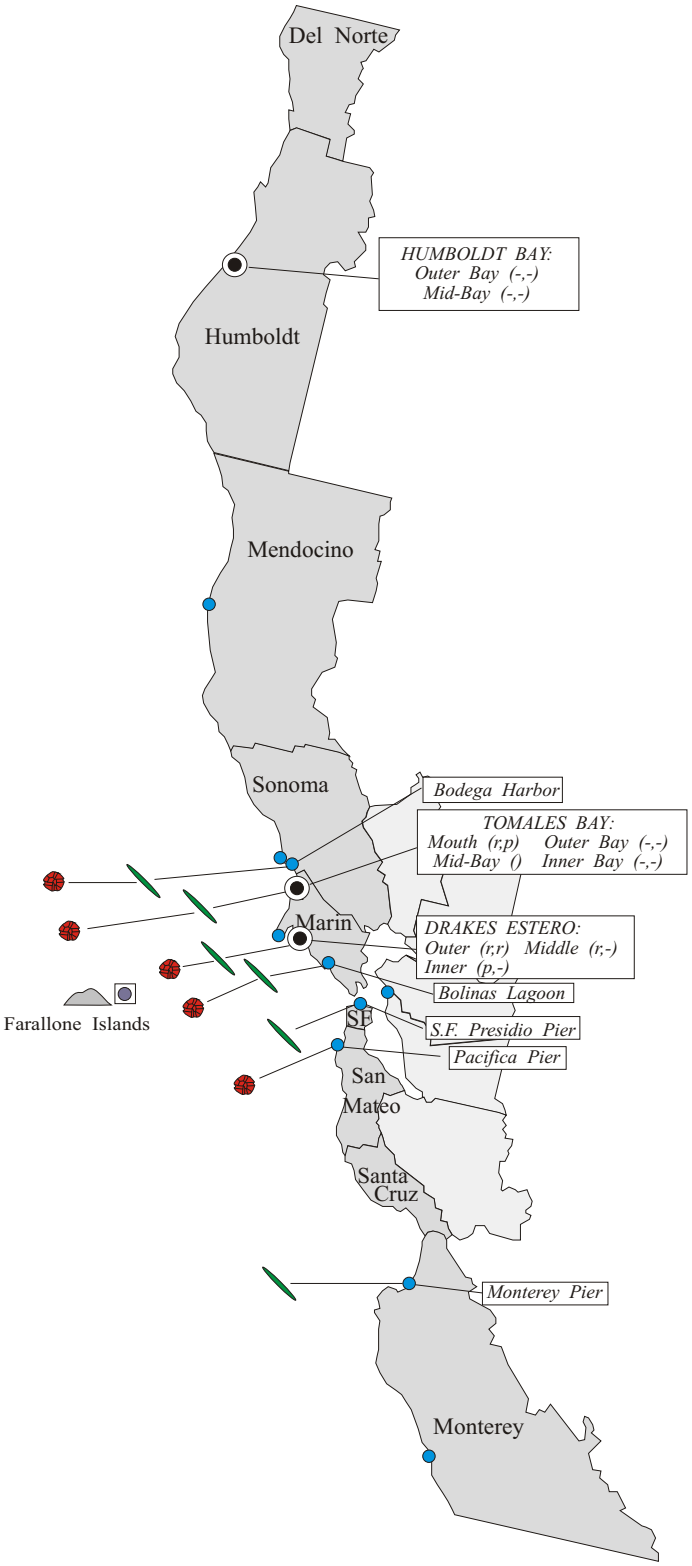
Pseudo-nitzschia species (includes all known potential domoic acid producing diatoms). *Pseudo-nitzschia* was observed along most southern California coastal counties. In general the relative abundances of this diatom were reduced from December's observations.

The Phytoplankton Monitoring Program, managed by the California Department of Health Services, is a state-wide program designed to detect toxin producing species of phytoplankton in ocean water before they impact California's valuable shellfish resources or become a threat to consumer safety.

For More Information Please Call:
(510) 540 - 3423

For Recorded Biotoxin Information Call:
(800) 553 - 4133

Distribution of Toxin-Producing Phytoplankton Northern California



Northern California Summary:

Alexandrium catenella (Dinoflagellate that produces paralytic shellfish poisoning (PSP) toxins). *Alexandrium* was identified at several sites along the northern California coast during January, however the distribution was limited to the coastline of Sonoma and Marin counties. The relative abundance and cell numbers were low for all observations.

Pseudo-nitzschia species (includes all known potential domoic acid producing diatoms). Low numbers of *Pseudo-nitzschia* were observed at several sites along the northern California coast in January.

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CALIFORNIA DEPARTMENT OF HEALTH SERVICES
2151 Berkeley Way, Berkeley CA 94704-1011

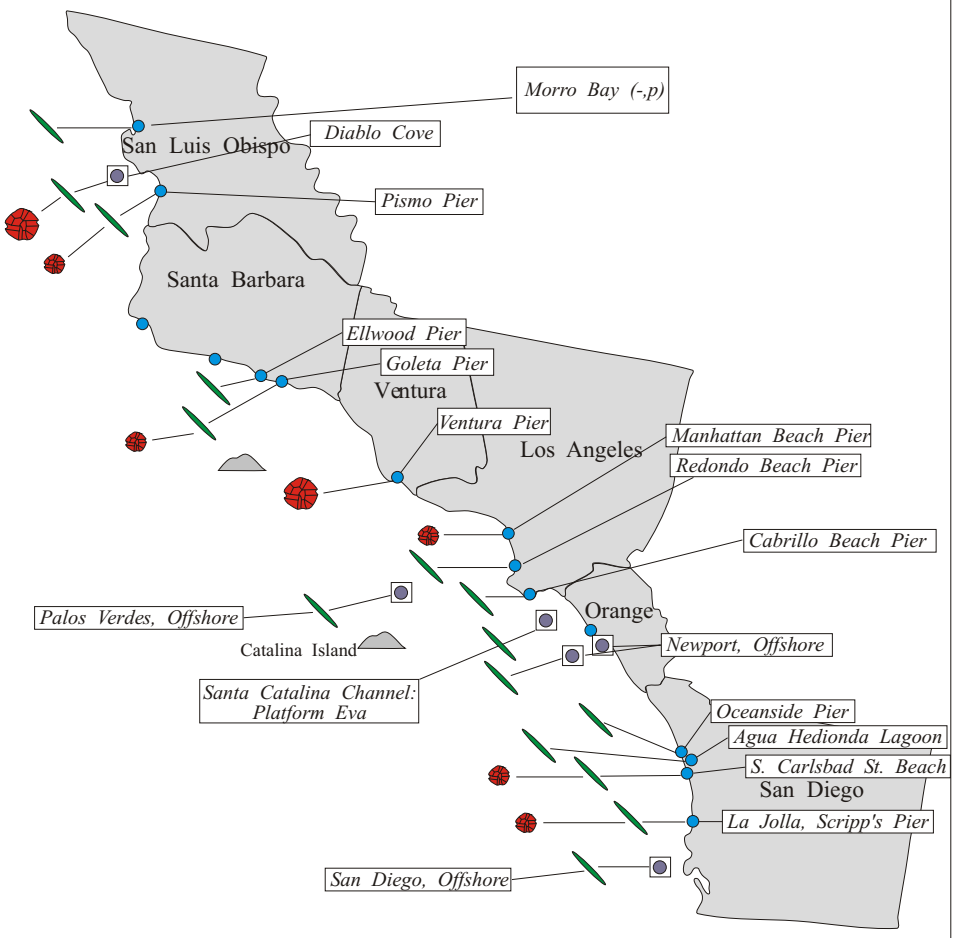
ENVIRONMENTAL MANAGEMENT BRANCH
Phytoplankton Monitoring Program

Phytoplankton Monthly Report

February 2001

Technical Report No. 01-09

Distribution of Toxin-Producing Phytoplankton
Southern California



Relative Abundance of Known Toxin Producers

Alexandrium Species

- Rare (less than 1%)
- Present (between 1% and 10%)
- Common (between 10% and 50%)
- Abundant (greater than 50%)

Pseudo-nitzschia Species

- Present (less than 10%)
- Common (between 10% and 50%)
- Abundant (greater than 50%)

MONTHLY SAMPLING STATIONS:

- Single Sampling Station
- Multiple Sampling Stations
- Offshore Sampling Station

For areas with multiple sampling stations, species abundance at each station is represented as follows:
(a,p) = Abundance for Alexandrium and Pseudo-nitzschia.
e.g., (c,p) = common, present; (a,-) = abundant, not observed

Southern California Summary:

Alexandrium catenella (Dinoflagellate that produces paralytic shellfish poisoning (PSP) toxins). Low numbers of *Alexandrium* were observed along much of the southern California coast during February. The highest relative abundances were observed offshore of San Luis Obispo County (Diablo Cove) and at the Ventura Pier.

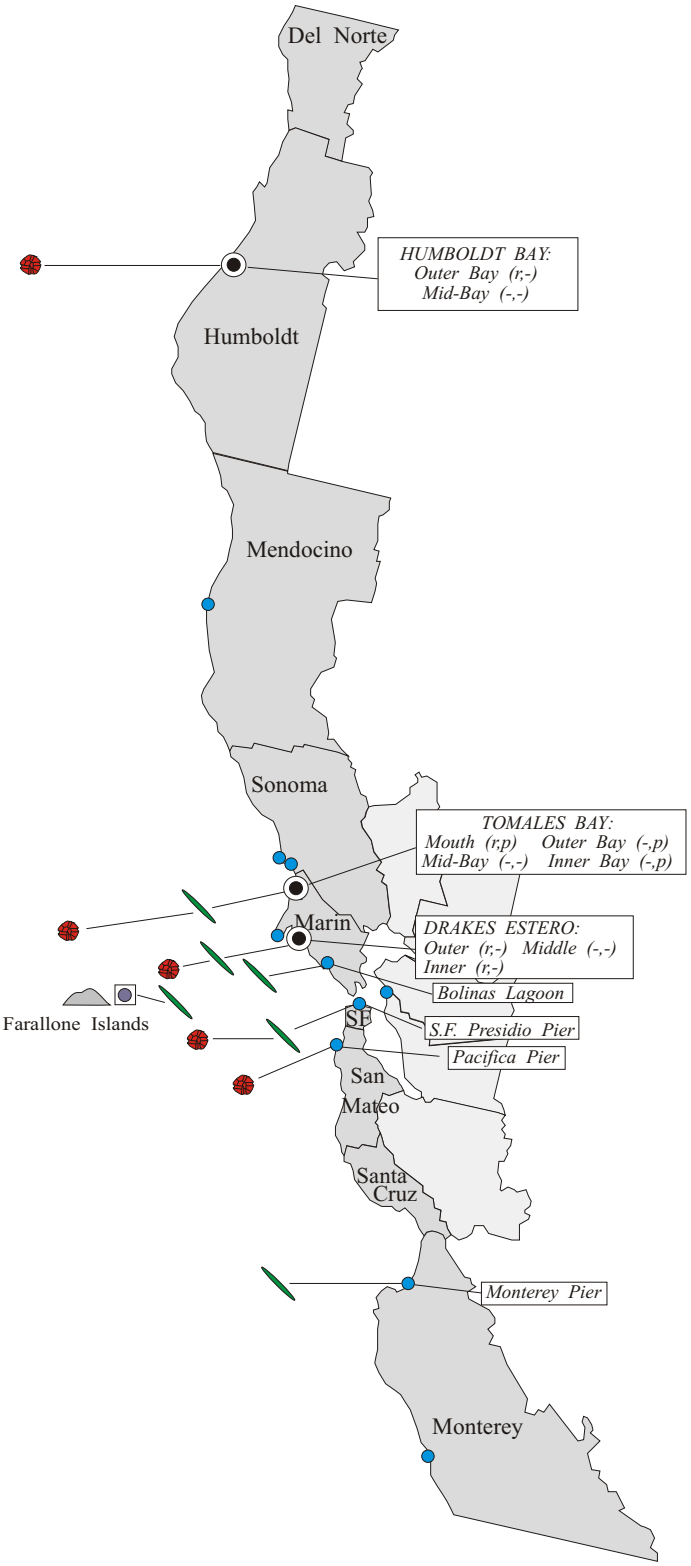
Pseudo-nitzschia species (includes all known potential domoic acid producing diatoms). Low numbers of *Pseudo-nitzschia* were observed along most southern California coastal counties in February.

The Phytoplankton Monitoring Program, managed by the California Department of Health Services, is a state-wide program designed to detect toxin producing species of phytoplankton in ocean water before they impact California's valuable shellfish resources or become a threat to consumer safety.

For More Information Please Call:
(510) 540 - 3423

For Recorded Biotoxin Information Call:
(800) 553 - 4133

Distribution of Toxin-Producing Phytoplankton Northern California



Northern California Summary:

Alexandrium catenella (Dinoflagellate that produces paralytic shellfish poisoning (PSP) toxins). *Alexandrium* was identified at several sites along the northern California coast during February. The distribution of this toxin producer was similar to January's observations with the inclusion of Humboldt Bay in this month's observations.

Pseudo-nitzschia species (includes all known potential domoic acid producing diatoms). Low numbers of *Pseudo-nitzschia* were observed at several sites along the northern California coast in February.

The Phytoplankton Monitoring Program, managed by the California Department of Health Services, is a state-wide program designed to detect toxin producing species of phytoplankton in ocean water before they impact California's valuable shellfish resources or become a threat to consumer safety.

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CALIFORNIA DEPARTMENT OF HEALTH SERVICES
2151 Berkeley Way, Berkeley CA 94704-1011

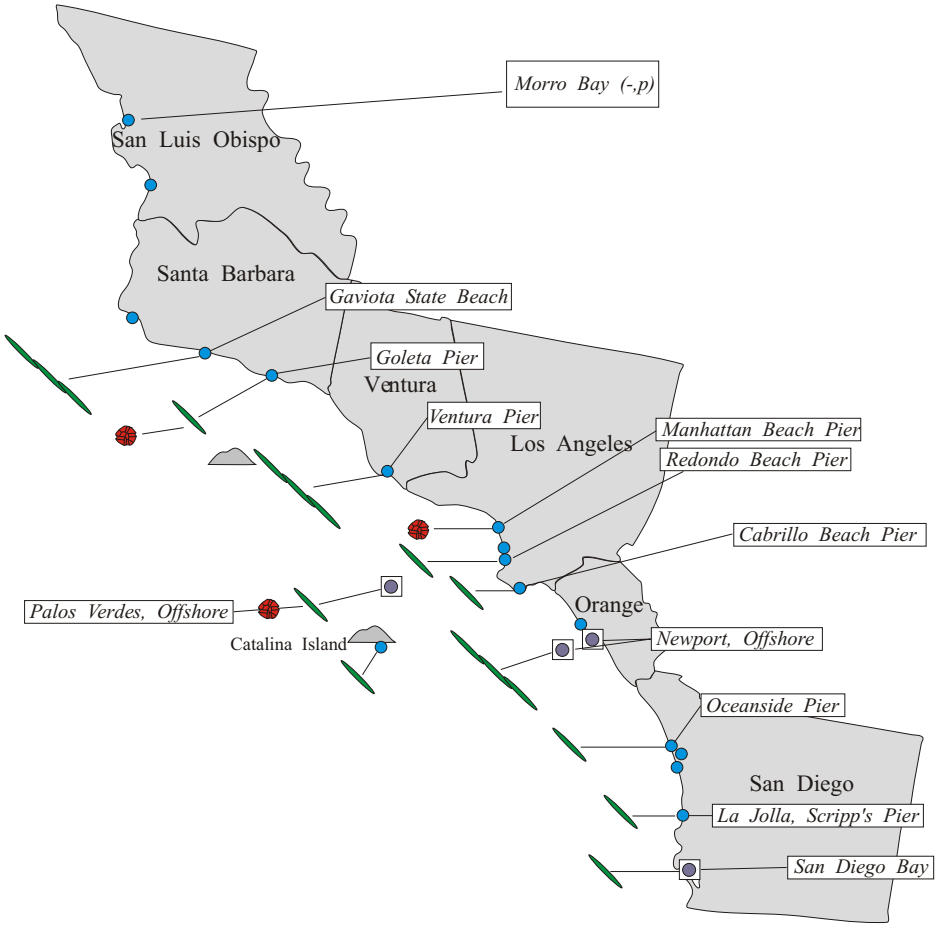
ENVIRONMENTAL MANAGEMENT BRANCH
Phytoplankton Monitoring Program

Phytoplankton Monthly Report

March 2001

Technical Report No. 01-11

Distribution of Toxin-Producing Phytoplankton
Southern California



Relative Abundance of Known Toxin Producers

Alexandrium Species

- Rare (less than 1%)
- Present (between 1% and 10%)
- Common (between 10% and 50%)
- Abundant (greater than 50%)

Pseudo-nitzschia Species

- Present (less than 10%)
- Common (between 10% and 50%)
- Abundant (greater than 50%)

MONTHLY SAMPLING STATIONS:

- Single Sampling Station
- Multiple Sampling Stations
- Offshore Sampling Station

For areas with multiple sampling stations, species abundance at each station is represented as follows:
(a,p) = Abundance for Alexandrium and Pseudo-nitzschia.
e.g., (c,p) = common, present; (a,-) = abundant, not observed

Southern California Summary:

Alexandrium catenella (Dinoflagellate that produces paralytic shellfish poisoning (PSP) toxins). Low numbers of *Alexandrium* were observed at only one southern California location, offshore of Palos Verdes, during March.

Pseudo-nitzschia species (includes all known potential domoic acid producing diatoms). *Pseudo-nitzschia* was observed along most southern California coastal counties in March. The relative abundance of this diatom increased at locations along the coast of Santa Barbara, Ventura, and Orange counties compared to February's observations.

The Phytoplankton Monitoring Program, managed by the California Department of Health Services, is a state-wide program designed to detect toxin producing species of phytoplankton in ocean water before they impact California's valuable shellfish resources or become a threat to consumer safety.

For More Information Please Call:
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For Recorded Biotoxin Information Call:
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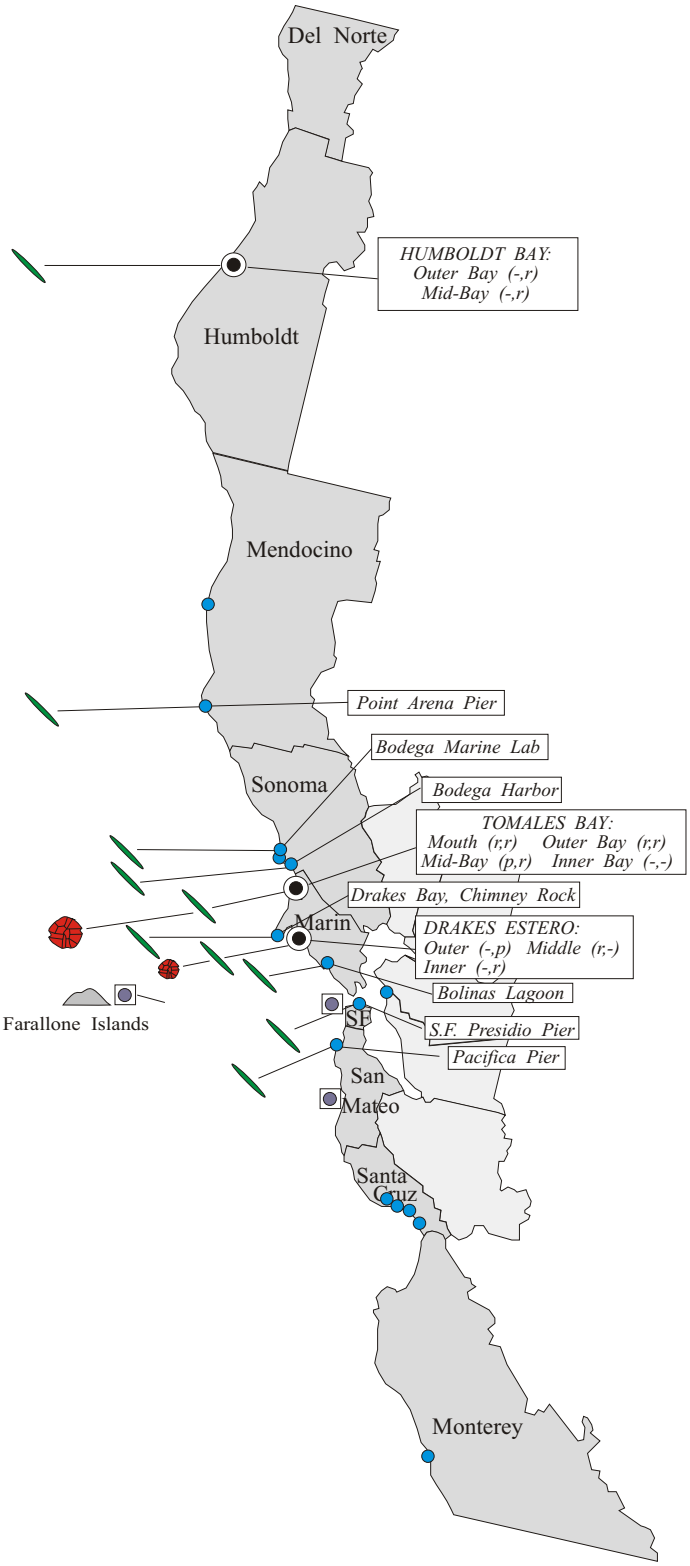
Distribution of Toxin-Producing Phytoplankton Northern California



Northern California Summary:

Alexandrium catenella (Dinoflagellate that produces paralytic shellfish poisoning (PSP) toxins). *Alexandrium* was identified at only two sites along the northern California coast during March. .

Pseudo-nitzschia species (includes all known potential domoic acid producing diatoms). Low numbers of *Pseudo-nitzschia* were observed at several sites along the northern California coast in March.

The Phytoplankton Monitoring Program, managed by the California Department of Health Services, is a state-wide program designed to detect toxin producing species of phytoplankton in ocean water before they impact California's valuable shellfish resources or become a threat to consumer safety.

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(510) 540 - 3423

For Recorded Biotoxin Information Call:
(800) 553 - 4133

CALIFORNIA DEPARTMENT OF HEALTH SERVICES
2151 Berkeley Way, Berkeley CA 94704-1011

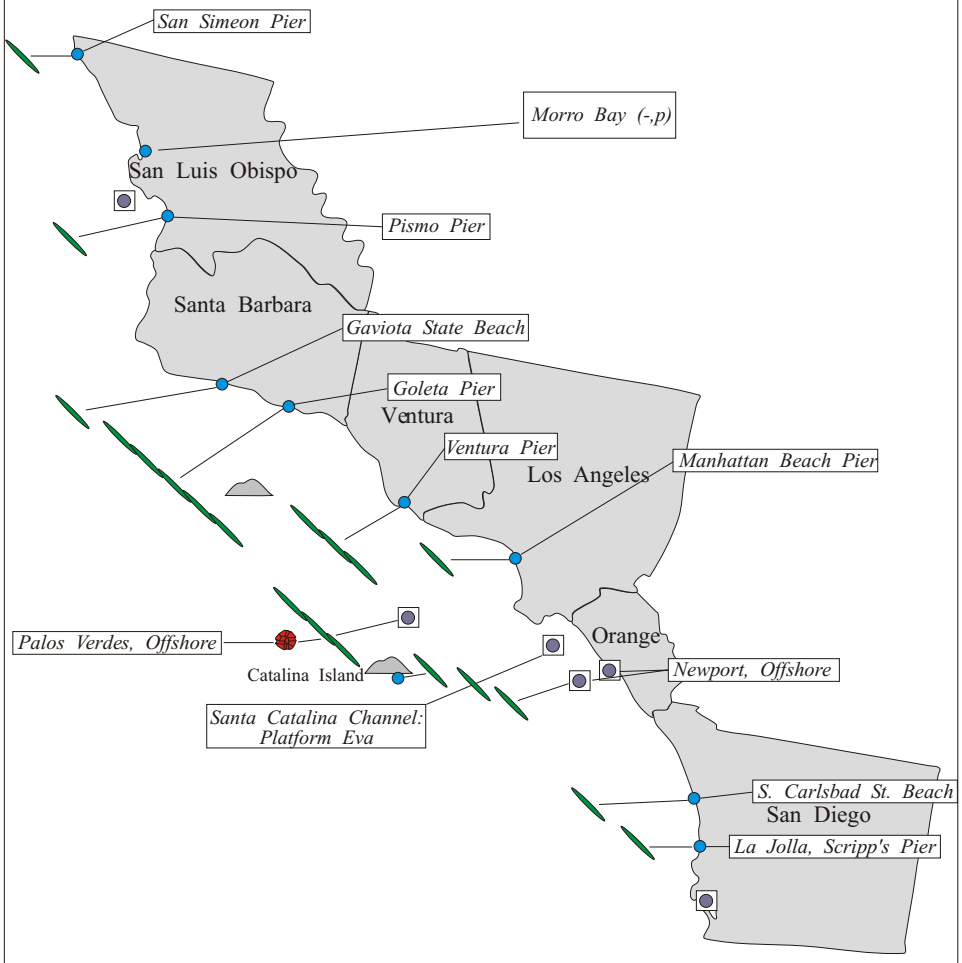
ENVIRONMENTAL MANAGEMENT BRANCH
Phytoplankton Monitoring Program

Phytoplankton Monthly Report

April 2001

Technical Report No. 01-14

Distribution of Toxin-Producing Phytoplankton
Southern California



Relative Abundance of Known Toxin Producers

Alexandrium Species

- Rare (less than 1%)
- Present (between 1% and 10%)
- Common (between 10% and 50%)
- Abundant (greater than 50%)

Pseudo-nitzschia Species

- Present (less than 10%)
- Common (between 10% and 50%)
- Abundant (greater than 50%)

MONTHLY SAMPLING STATIONS:

- Single Sampling Station
- Multiple Sampling Stations
- Offshore Sampling Station

For areas with multiple sampling stations, species abundance at each station is represented as follows:
(a,p) = Abundance for Alexandrium and Pseudo-nitzschia.
e.g., (c,p) = common, present; (a,-) = abundant, not observed

Southern California Summary:

Alexandrium catenella (Dinoflagellate that produces paralytic shellfish poisoning (PSP) toxins). Low numbers of *Alexandrium* were observed at only one southern California location, offshore of Palos Verdes, during April.

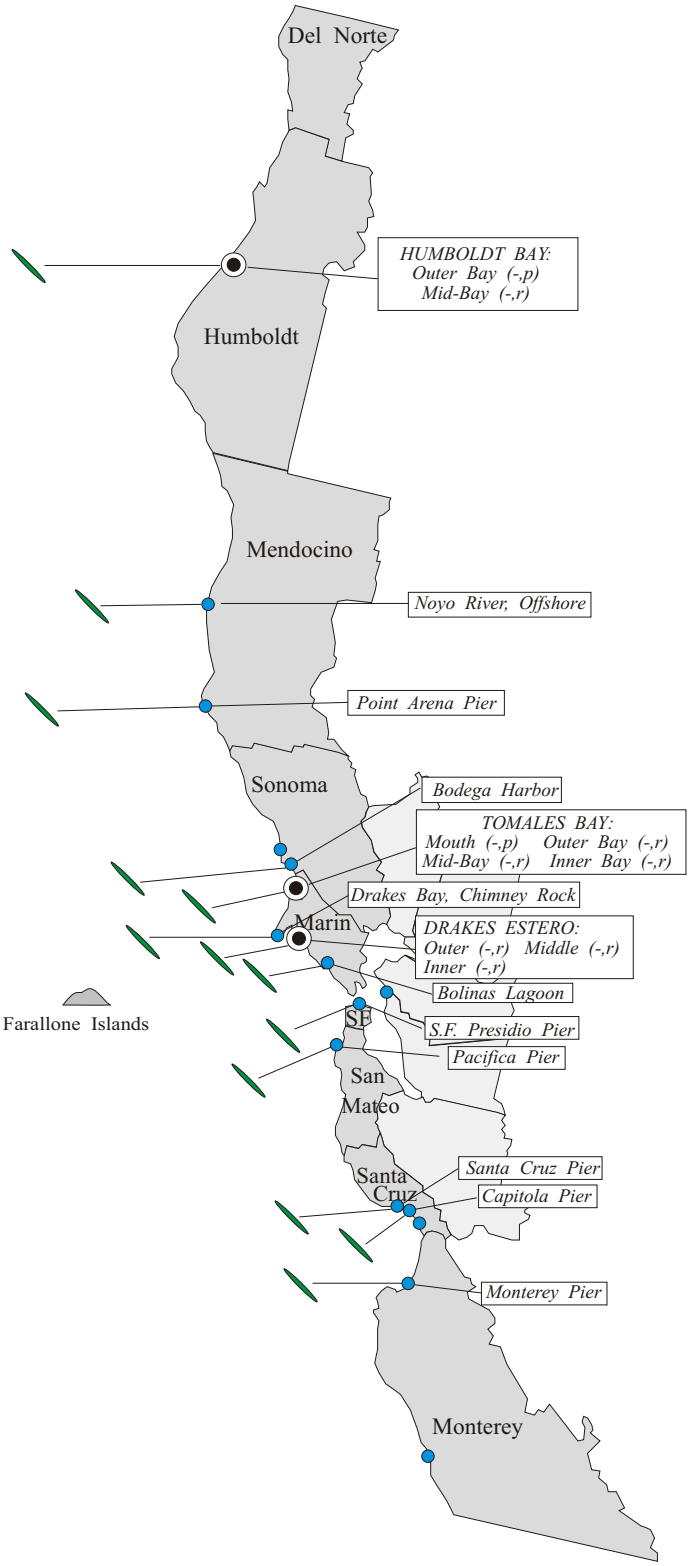
Pseudo-nitzschia species (includes all known potential domoic acid producing diatoms). *Pseudo-nitzschia* was observed along most southern California coastal counties in April. The relative abundance of this diatom increased throughout the month from rare to abundant at Goleta Pier (Santa Barbara County).

The Phytoplankton Monitoring Program, managed by the California Department of Health Services, is a state-wide program designed to detect toxin producing species of phytoplankton in ocean water before they impact California's valuable shellfish resources or become a threat to consumer safety.

For More Information Please Call:
(510) 540 - 3423

For Recorded Biotoxin Information Call:
(800) 553 - 4133

Distribution of Toxin-Producing Phytoplankton Northern California



Northern California Summary:

Alexandrium catenella (Dinoflagellate that produces paralytic shellfish poisoning (PSP) toxins). *Alexandrium* was not observed along the northern California coast during April.

Pseudo-nitzschia species (includes all known potential domoic acid producing diatoms). Low numbers of *Pseudo-nitzschia* were observed atmost sampling locations along the northern California coast in April.

The Phytoplankton Monitoring Program, managed by the California Department of Health Services, is a state-wide program designed to detect toxin producing species of phytoplankton in ocean water before they impact California's valuable shellfish resources or become a threat to consumer safety.

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(510) 540 - 3423

For Recorded Biotoxin Information Call:
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CALIFORNIA DEPARTMENT OF HEALTH SERVICES
2151 Berkeley Way, Berkeley CA 94704-1011

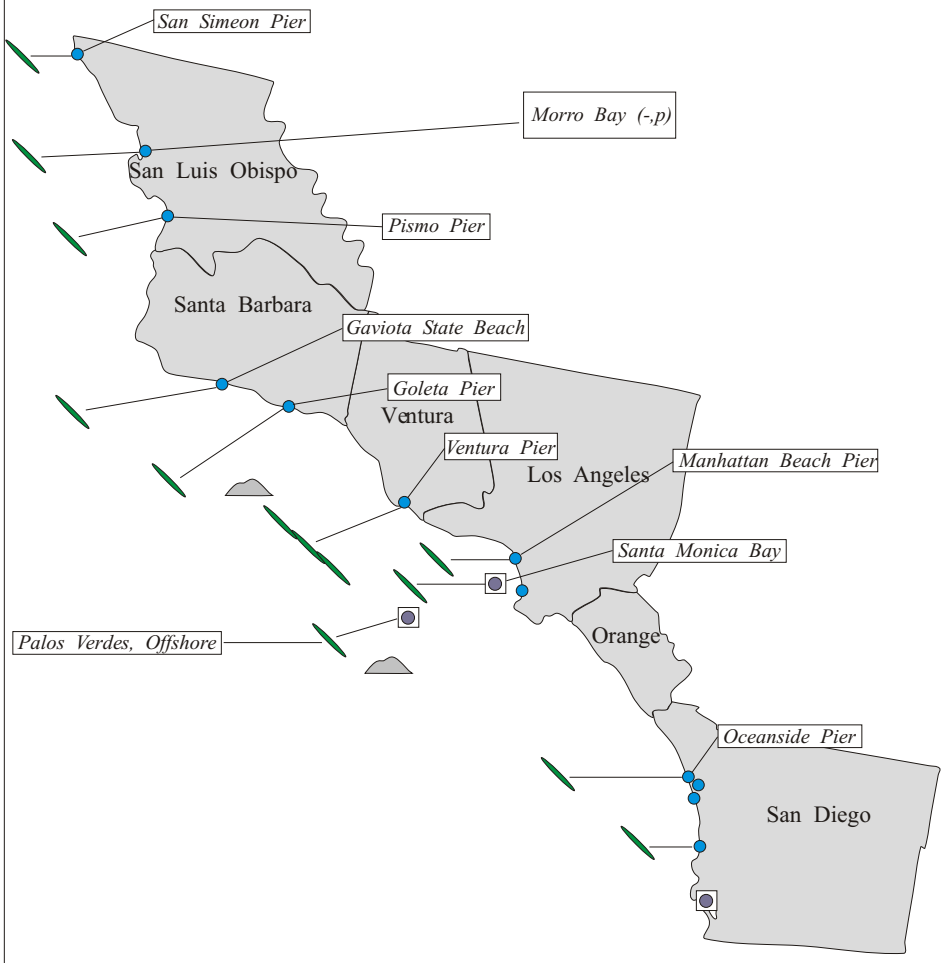
ENVIRONMENTAL MANAGEMENT BRANCH
Phytoplankton Monitoring Program

Phytoplankton Monthly Report

May 2001

Technical Report No. 01-16

Distribution of Toxin-Producing Phytoplankton
Southern California



Relative Abundance of Known Toxin Producers

Alexandrium Species

- Rare (less than 1%)
- Present (between 1% and 10%)
- Common (between 10% and 50%)
- Abundant (greater than 50%)

Pseudo-nitzschia Species

- Present (less than 10%)
- Common (between 10% and 50%)
- Abundant (greater than 50%)

MONTHLY SAMPLING STATIONS:

- Single Sampling Station
- Multiple Sampling Stations
- Offshore Sampling Station

For areas with multiple sampling stations, species abundance at each station is represented as follows:
(a,p) = Abundance for Alexandrium and Pseudo-nitzschia.
e.g., (c,p) = common, present; (a,-) = abundant, not observed

Southern California Summary:

Alexandrium catenella (Dinoflagellate that produces paralytic shellfish poisoning (PSP) toxins). *Alexandrium* was not observed at any southern California location during May.

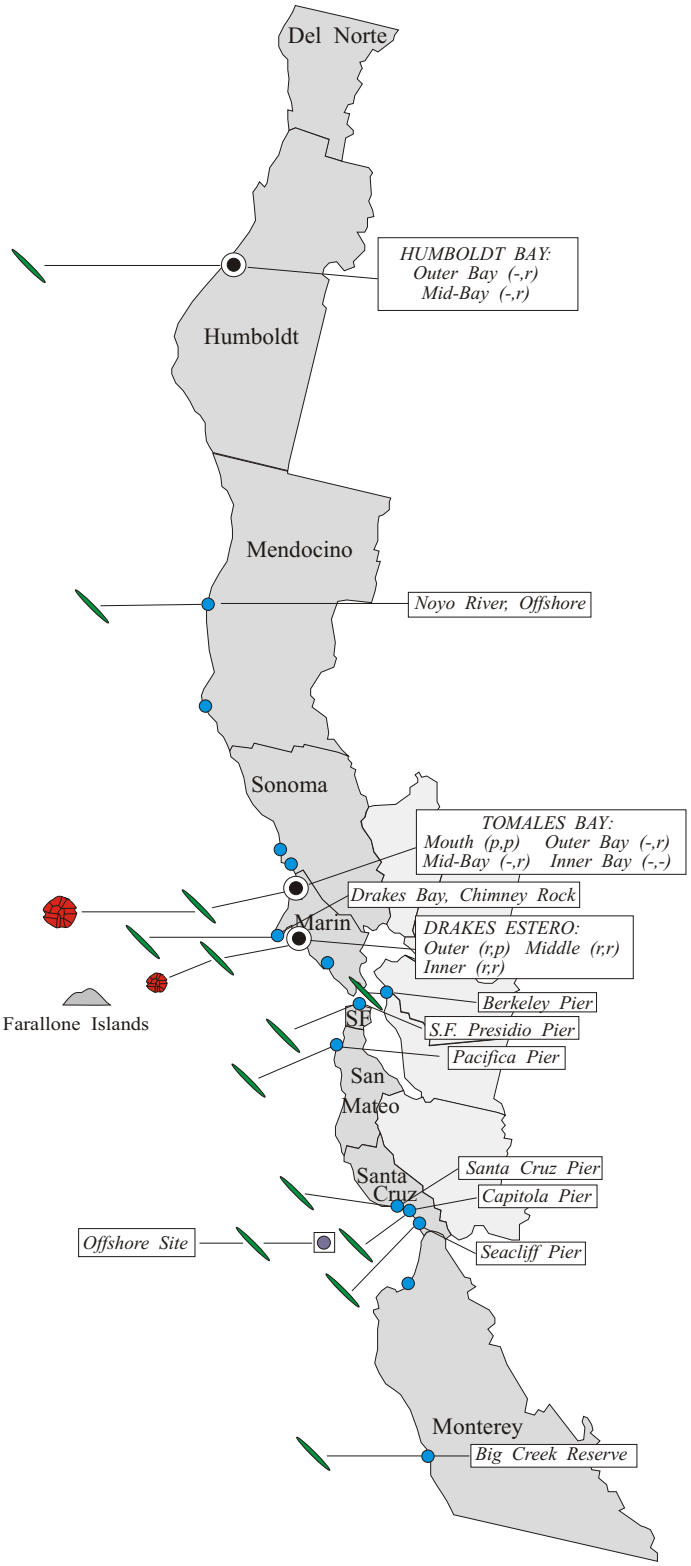
Pseudo-nitzschia species (includes all known potential domoic acid producing diatoms). *Pseudo-nitzschia* was observed along most southern California coastal counties in May. The relative abundance of this diatom was low at most sites.

The Phytoplankton Monitoring Program, managed by the California Department of Health Services, is a state-wide program designed to detect toxin producing species of phytoplankton in ocean water before they impact California's valuable shellfish resources or become a threat to consumer safety.

For More Information Please Call:
(510) 540 - 3423

For Recorded Biotoxin Information Call:
(800) 553 - 4133

Distribution of Toxin-Producing Phytoplankton Northern California



Northern California Summary:

Alexandrium catenella (Dinoflagellate that produces paralytic shellfish poisoning (PSP) toxins). *Alexandrium* was observed at two northern California sites, both along the Marin coast, during May.

Pseudo-nitzschia species (includes all known potential domoic acid producing diatoms). Low numbers of *Pseudo-nitzschia* were observed at most sampling locations along the northern California coast in May, including a site inside San Francisco Bay.

The Phytoplankton Monitoring Program, managed by the California Department of Health Services, is a state-wide program designed to detect toxin producing species of phytoplankton in ocean water before they impact California's valuable shellfish resources or become a threat to consumer safety.

For More Information Please Call:
(510) 540 - 3423

For Recorded Biotoxin Information Call:
(800) 553 - 4133

CALIFORNIA DEPARTMENT OF HEALTH SERVICES
2151 Berkeley Way, Berkeley CA 94704-1011

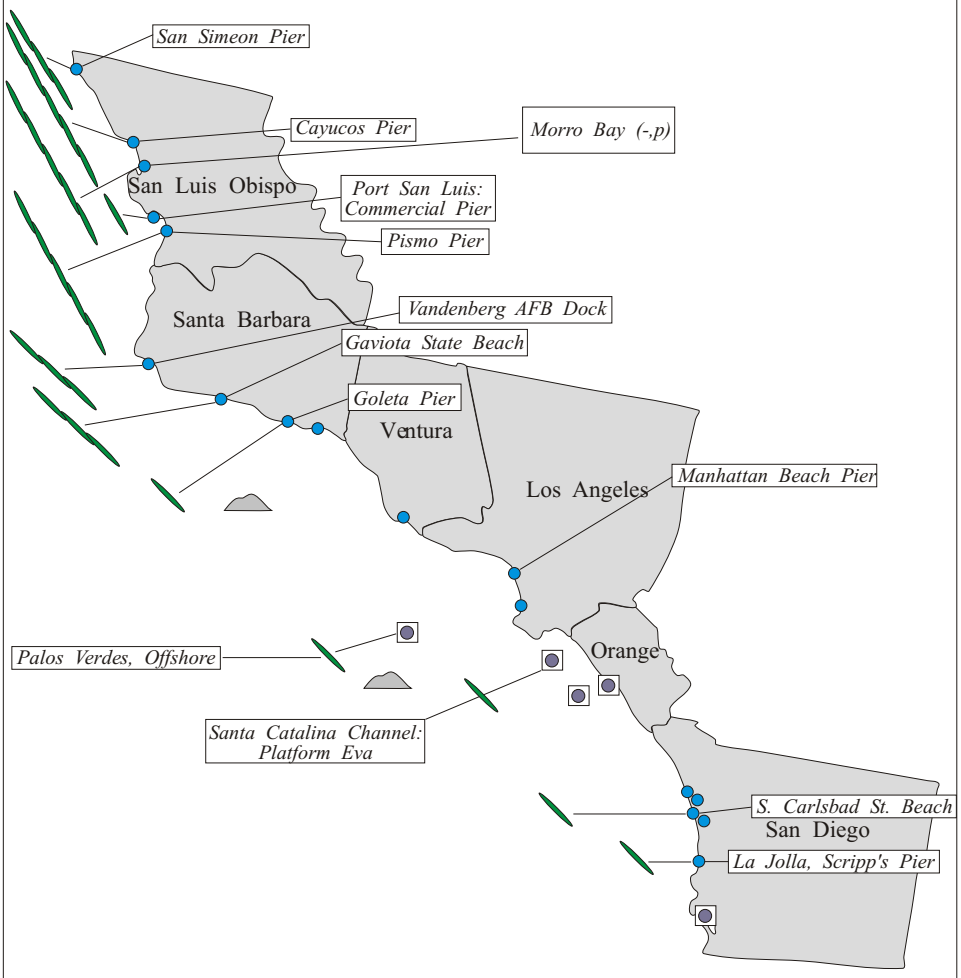
ENVIRONMENTAL MANAGEMENT BRANCH
Phytoplankton Monitoring Program

Phytoplankton Monthly Report

June 2001

Technical Report No. 01-18

Distribution of Toxin-Producing Phytoplankton
Southern California



Relative Abundance of Known Toxin Producers

Alexandrium Species

- Rare (less than 1%)
- Present (between 1% and 10%)
- Common (between 10% and 50%)
- Abundant (greater than 50%)

Pseudo-nitzschia Species

- Present (less than 10%)
- Common (between 10% and 50%)
- Abundant (greater than 50%)

MONTHLY SAMPLING STATIONS:

- Single Sampling Station
- Multiple Sampling Stations
- Offshore Sampling Station

For areas with multiple sampling stations, species abundance at each station is represented as follows:
(a,p) = Abundance for Alexandrium and Pseudo-nitzschia.
e.g., (c,p) = common, present; (a,-) = abundant, not observed

Southern California Summary:

Alexandrium catenella (Dinoflagellate that produces paralytic shellfish poisoning (PSP) toxins). *Alexandrium* was not observed at any southern California location during June.

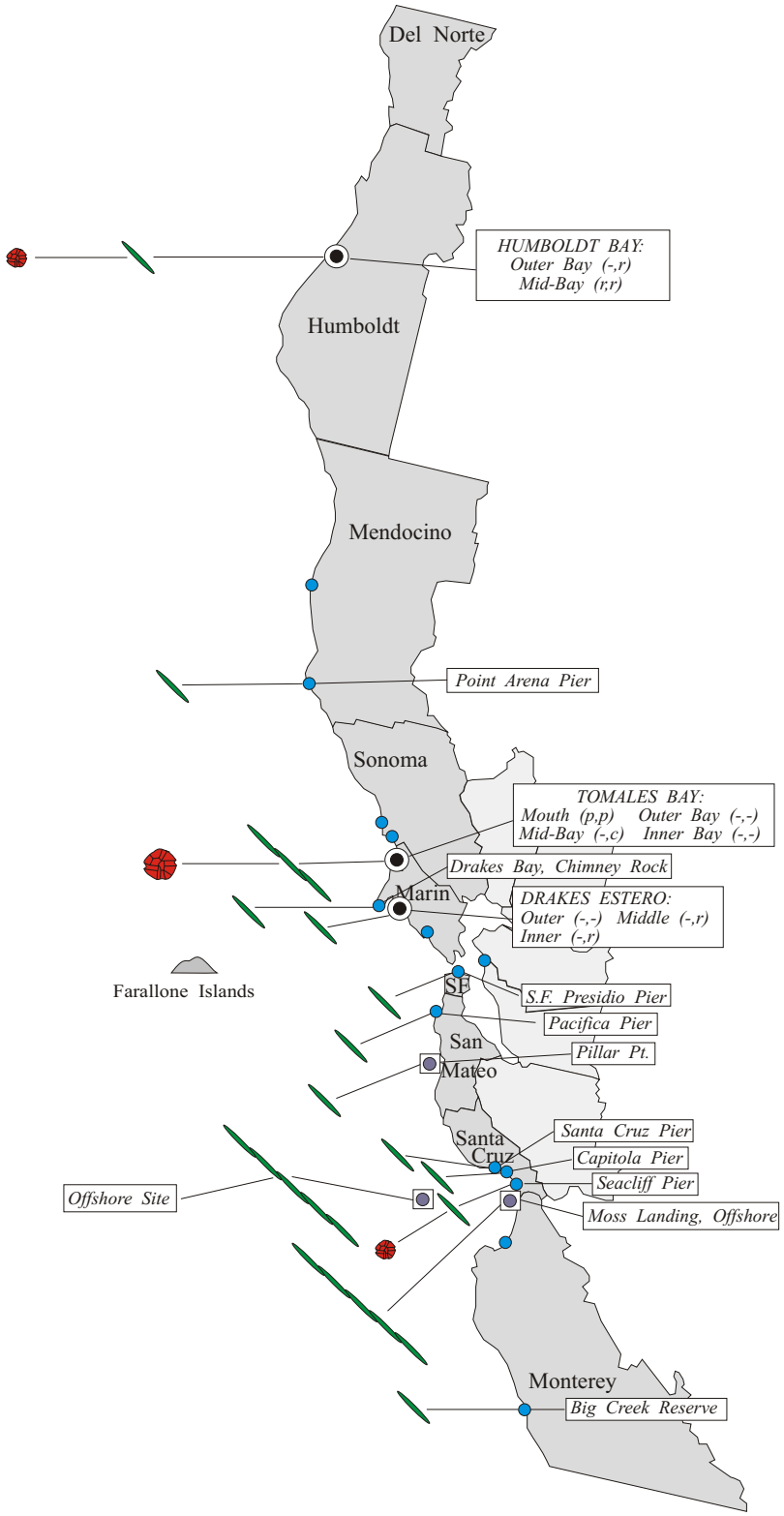
Pseudo-nitzschia species (includes all known potential domoic acid producing diatoms). *Pseudo-nitzschia* numbers increased dramatically from Gaviota Pier (Santa Barbara) northward to San Simeon (San Luis Obispo). The cell densities and relative abundance of this diatom was greatest along the northern half of San Luis Obispo County. Conversely, *Pseudo-nitzschia* appeared to be declining along the more southern counties (Ventura to San Diego).

The Phytoplankton Monitoring Program, managed by the California Department of Health Services, is a state-wide program designed to detect toxin producing species of phytoplankton in ocean water before they impact California's valuable shellfish resources or become a threat to consumer safety.

For More Information Please Call:
(510) 540 - 3423

For Recorded Biotoxin Information Call:
(800) 553 - 4133

Distribution of Toxin-Producing Phytoplankton Northern California



Northern California Summary:

Alexandrium catenella (Dinoflagellate that produces paralytic shellfish poisoning (PSP) toxins). *Alexandrium* was observed at three northern California sites during June. Low numbers were observed inside Humboldt Bay, at the mouth of Tomales Bay (Marin), and at Seacliff Pier (Santa Cruz).

Pseudo-nitzschia species (includes all known potential domoic acid producing diatoms). Low numbers of *Pseudo-nitzschia* were observed at most sampling locations along the northern California coast in June. High relative abundances were observed at two offshore sampling locations in Monterey Bay.

The Phytoplankton Monitoring Program, managed by the California Department of Health Services, is a state-wide program designed to detect toxin producing species of phytoplankton in ocean water before they impact California's valuable shellfish resources or become a threat to consumer safety.

For More Information Please Call:
(510) 540 - 3423

For Recorded Biotoxin Information Call:
(800) 553 - 4133

CALIFORNIA DEPARTMENT OF HEALTH SERVICES
2151 Berkeley Way, Berkeley CA 94704-1011

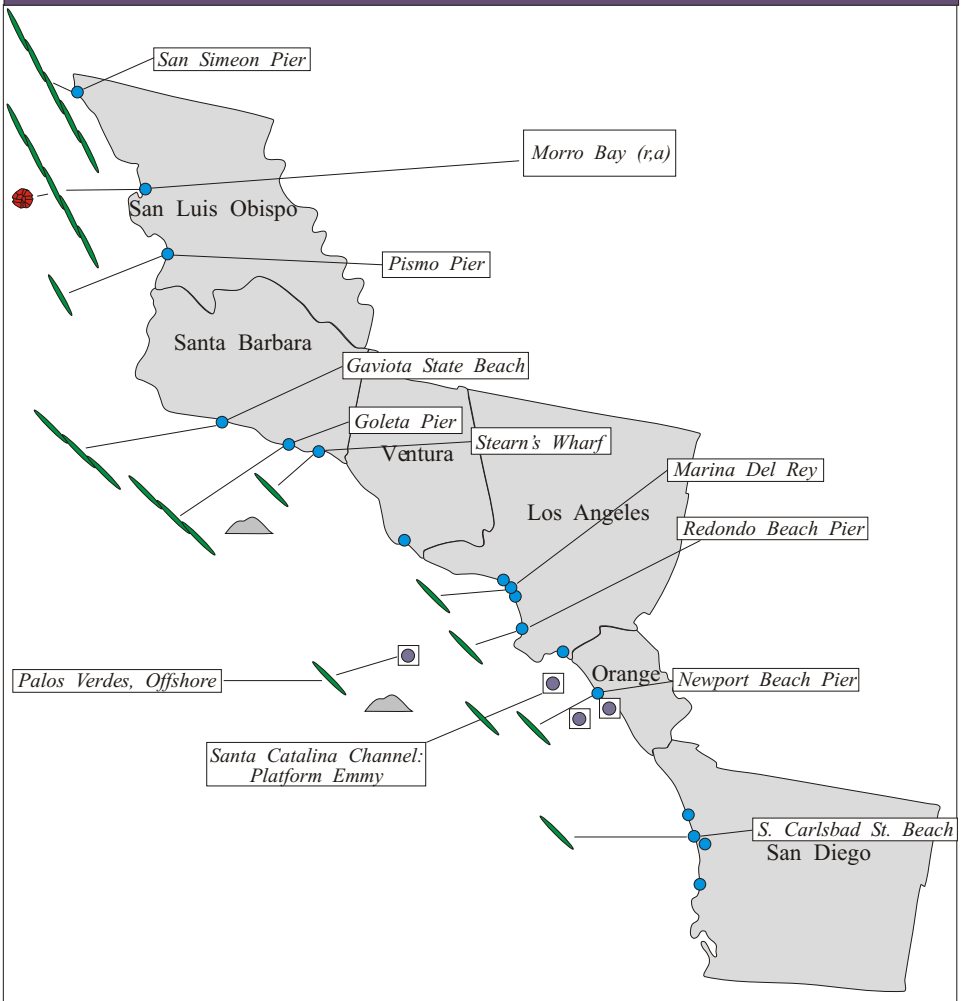
ENVIRONMENTAL MANAGEMENT BRANCH
Phytoplankton Monitoring Program

Phytoplankton Monthly Report

July 2001

Technical Report No. 01-23

Distribution of Toxin-Producing Phytoplankton
Southern California



Relative Abundance of Known Toxin Producers

Alexandrium Species

- Rare (less than 1%)
- Present (between 1% and 10%)
- Common (between 10% and 50%)
- Abundant (greater than 50%)

Pseudo-nitzschia Species

- Present (less than 10%)
- Common (between 10% and 50%)
- Abundant (greater than 50%)

MONTHLY SAMPLING STATIONS:

- Single Sampling Station
- Multiple Sampling Stations
- Offshore Sampling Station

For areas with multiple sampling stations, species abundance at each station is represented as follows:
(a,p) = Abundance for Alexandrium and Pseudo-nitzschia.
e.g., (c,p) = common, present; (a,-) = abundant, not observed

Southern California Summary:

Alexandrium catenella (Dinoflagellate that produces paralytic shellfish poisoning (PSP) toxins). *Alexandrium* was only observed at one southern California location (Morro Bay) during July.

Pseudo-nitzschia species (includes all known potential domoic acid producing diatoms). *Pseudo-nitzschia* numbers remained high along the San Luis Obispo coast, from Morro Bay to San Simeon. Moderate numbers of this diatom also continued to be observed along the Santa Barbara coast during July. *Pseudo-nitzschia* was present in much lower numbers farther south from Los Angeles to San Diego.

The Phytoplankton Monitoring Program, managed by the California Department of Health Services, is a state-wide program designed to detect toxin producing species of phytoplankton in ocean water before they impact California's valuable shellfish resources or become a threat to consumer safety.

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For Recorded Biotoxin Information Call:
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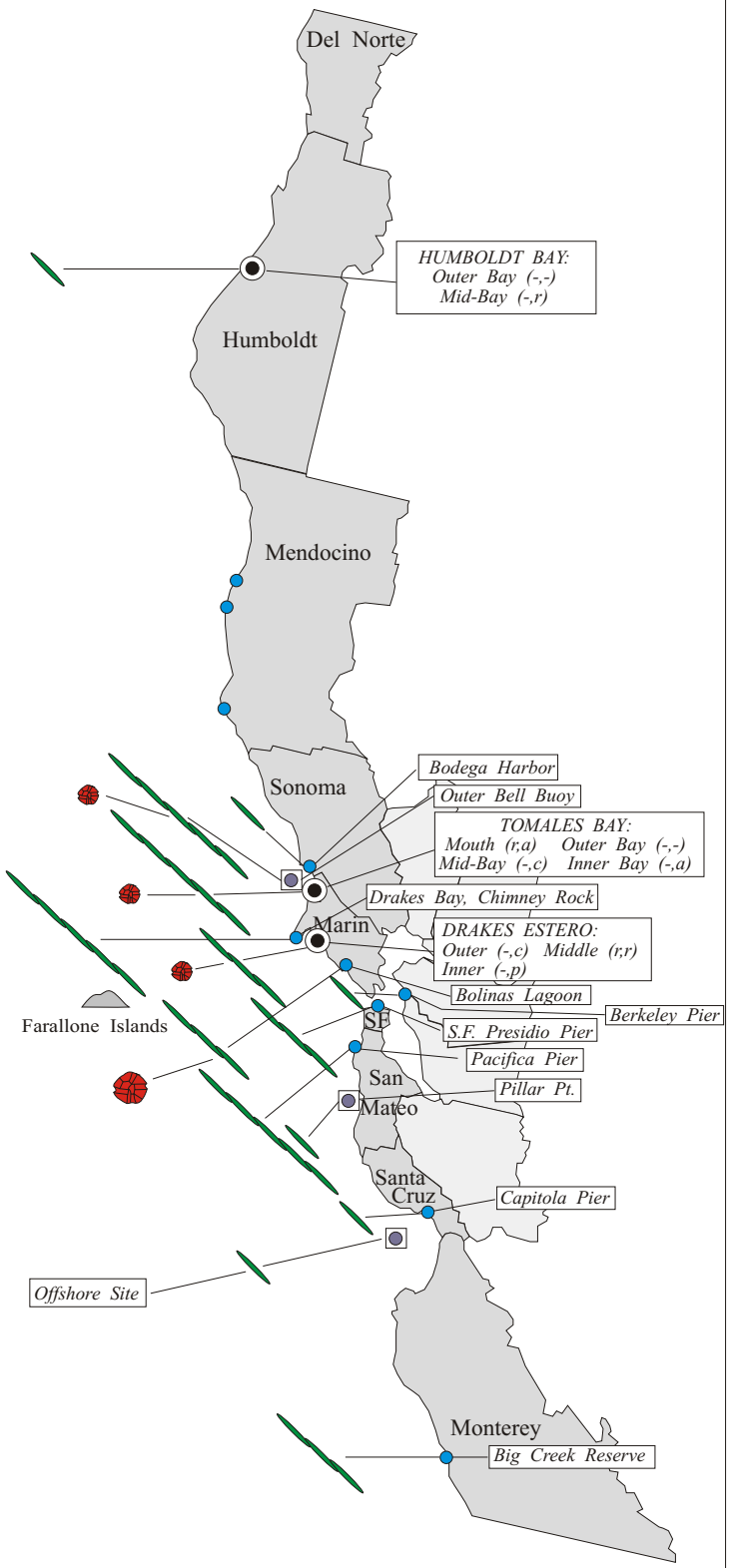
Distribution of Toxin-Producing Phytoplankton Northern California



Northern California Summary:

Alexandrium catenella (Dinoflagellate that produces paralytic shellfish poisoning (PSP) toxins). *Alexandrium* was observed at several northern California sites, all along the Marin coast, during July. The highest relative abundance observed was inside Bolinas Lagoon.

Pseudo-nitzschia species (includes all known potential domoic acid producing diatoms). *Pseudo-nitzschia* numbers decreased inside Monterey Bay in July compared to June's observations. However, the relative abundance of this dinoflagellate increased farther northward between northern San Mateo County and Sonoma County. This diatom was abundant in Tomales Bay, Bodega Bay, Drakes Bay, and Pacifica.

The Phytoplankton Monitoring Program, managed by the California Department of Health Services, is a state-wide program designed to detect toxin producing species of phytoplankton in ocean water before they impact California's valuable shellfish resources or become a threat to consumer safety.

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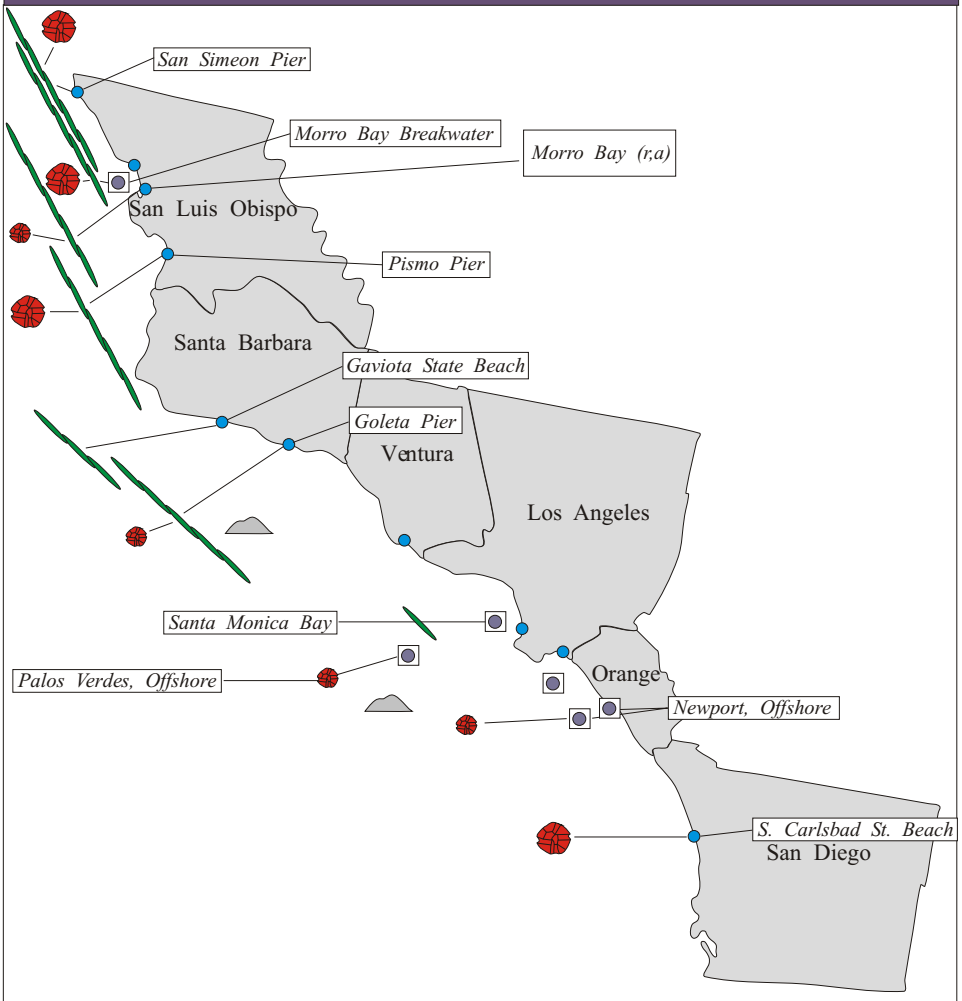
ENVIRONMENTAL MANAGEMENT BRANCH
Phytoplankton Monitoring Program

Phytoplankton Monthly Report

August 2001

Technical Report No. 01-25

Distribution of Toxin-Producing Phytoplankton
Southern California



Relative Abundance of Known Toxin Producers

Alexandrium Species

- Rare (less than 1%)
- Present (between 1% and 10%)
- Common (between 10% and 50%)
- Abundant (greater than 50%)

Pseudo-nitzschia Species

- Present (less than 10%)
- Common (between 10% and 50%)
- Abundant (greater than 50%)

MONTHLY SAMPLING STATIONS:

- Single Sampling Station
- Multiple Sampling Stations
- Offshore Sampling Station

For areas with multiple sampling stations, species abundance at each station is represented as follows:
(a,p) = Abundance for Alexandrium and Pseudo-nitzschia.
e.g., (c,p) = common, present; (a,-) = abundant, not observed

Southern California Summary:

Alexandrium catenella (Dinoflagellate that produces paralytic shellfish poisoning (PSP) toxins). *Alexandrium* increased in relative abundance and distribution in August compared to July's observations. This dinoflagellate was observed along most southern California coastal counties during August. *Alexandrium* was observed along the San Luis Obispo coast throughout the entire month.

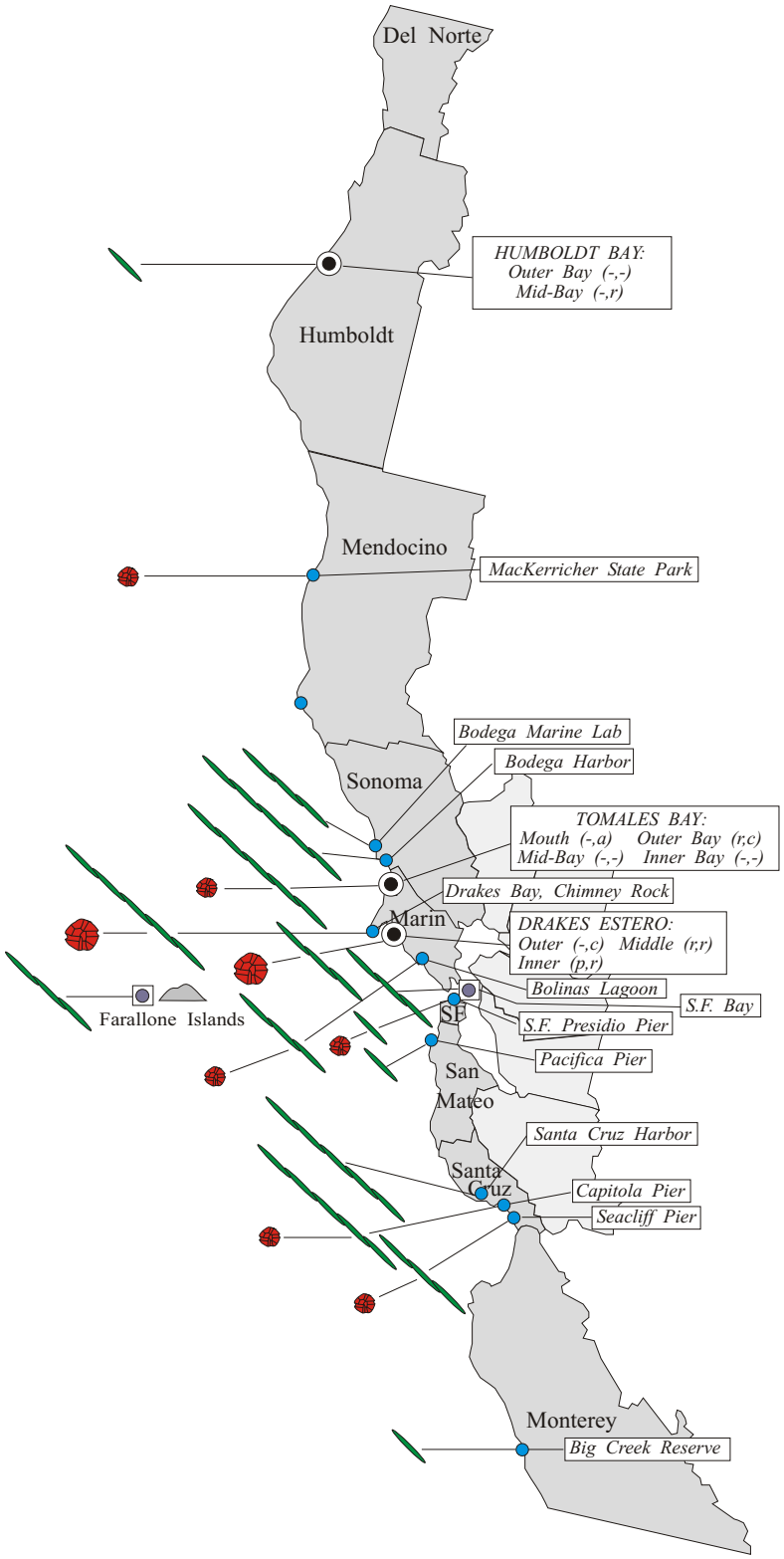
Pseudo-nitzschia species (includes all known potential domoic acid producing diatoms). *Pseudo-nitzschia* numbers remained high along the San Luis Obispo coast and increased in relative abundance at Goleta Pier in Santa Barbara County. This diatom was almost completely absent in samples collected farther south (Ventura to San Diego counties).

The Phytoplankton Monitoring Program, managed by the California Department of Health Services, is a state-wide program designed to detect toxin producing species of phytoplankton in ocean water before they impact California's valuable shellfish resources or become a threat to consumer safety.

For More Information Please Call:
(510) 540 - 3423

For Recorded Biotoxin Information Call:
(800) 553 - 4133

Distribution of Toxin-Producing Phytoplankton Northern California



Northern California Summary:

Alexandrium catenella (Dinoflagellate that produces paralytic shellfish poisoning (PSP) toxins). *Alexandrium* increased in relative abundance and distribution in August compared to July's observations. This dinoflagellate was observed along most of the northern California coast between Santa Cruz and Mendocino counties. The highest relative abundances were observed in the Drakes Bay region of the Marin coast.

Pseudo-nitzschia species (includes all known potential domoic acid producing diatoms). *Pseudo-nitzschia* numbers increased between Monterey Bay and Bodega Bay, with high relative abundances observed inside Monterey Bay, Tomales Bay, and Bodega Harbor.

The Phytoplankton Monitoring Program, managed by the California Department of Health Services, is a state-wide program designed to detect toxin producing species of phytoplankton in ocean water before they impact California's valuable shellfish resources or become a threat to consumer safety.

For More Information Please Call:
(510) 540 - 3423

For Recorded Biotoxin Information Call:
(800) 553 - 4133

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2151 Berkeley Way, Berkeley CA 94704-1011

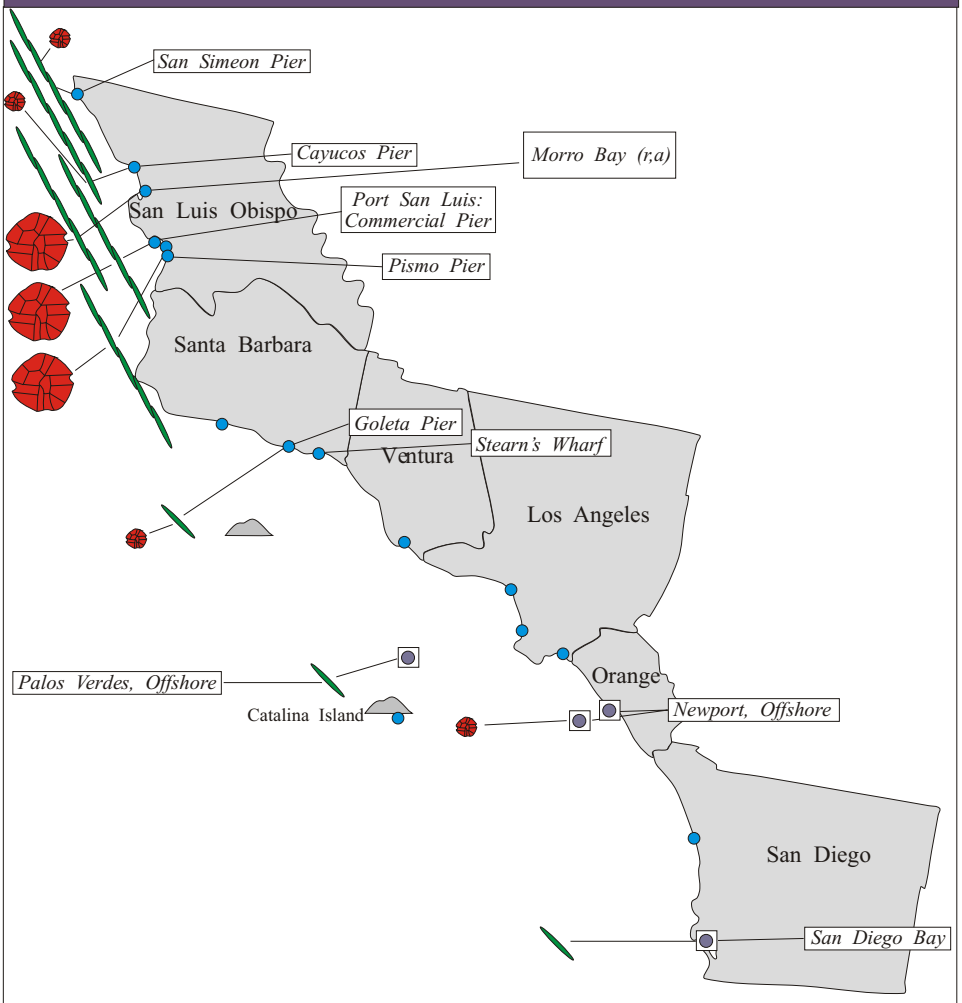
ENVIRONMENTAL MANAGEMENT BRANCH
Phytoplankton Monitoring Program

Phytoplankton Monthly Report

September 2001

Technical Report No. 01-27

Distribution of Toxin-Producing Phytoplankton
Southern California



Relative Abundance of Known Toxin Producers

Alexandrium Species

- Rare (less than 1%)
- Present (between 1% and 10%)
- Common (between 10% and 50%)
- Abundant (greater than 50%)

Pseudo-nitzschia Species

- Present (less than 10%)
- Common (between 10% and 50%)
- Abundant (greater than 50%)

MONTHLY SAMPLING STATIONS:

- Single Sampling Station
- Multiple Sampling Stations
- Offshore Sampling Station

For areas with multiple sampling stations, species abundance at each station is represented as follows:
(a,p) = Abundance for Alexandrium and Pseudo-nitzschia.
e.g., (c,p) = common, present; (a,-) = abundant, not observed

Southern California Summary:

Alexandrium catenella (Dinoflagellate that produces paralytic shellfish poisoning (PSP) toxins). *Alexandrium* increased dramatically in relative abundance along the San Luis Obispo coast in September compared to August's observations. The relative abundance along the San Luis Obispo coast increased throughout the month, peaking by September 22.

The distribution of this dinoflagellate declined for the rest of the southern California coast. Very low numbers of *Alexandrium* were observed at Goleta Pier (Santa Barbara County) and at the entrance to Newport Harbor (Orange County).

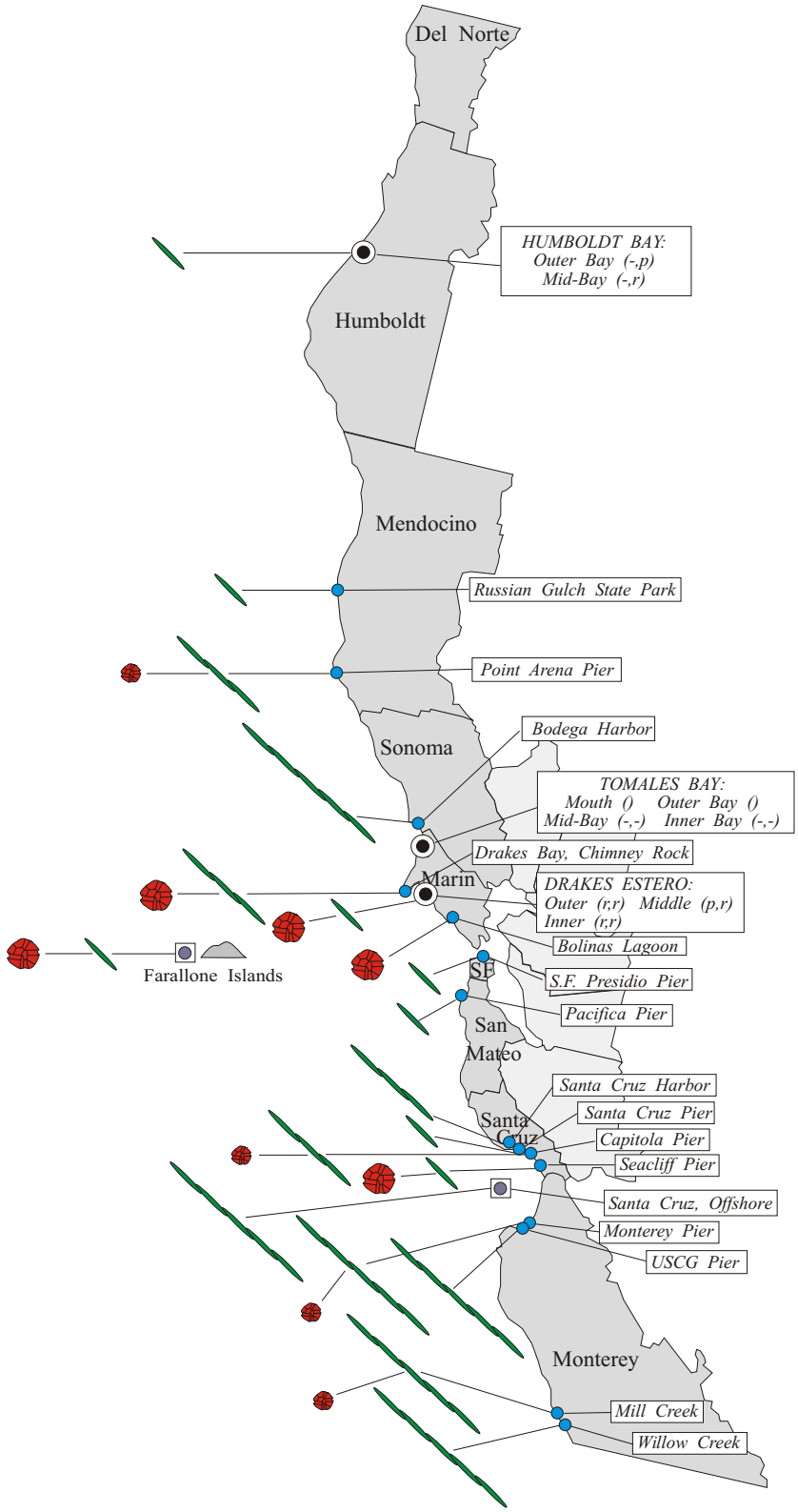
Pseudo-nitzschia species (includes all known potential domoic acid producing diatoms). *Pseudo-nitzschia* numbers remained high along the San Luis Obispo coast but appeared to decreas in relative abundance at Goleta Pier in Santa Barbara County. This diatom was very rare or absent in samples collected farther south (Ventura to San Diego counties).

The Phytoplankton Monitoring Program, managed by the California Department of Health Services, is a state-wide program designed to detect toxin producing species of phytoplankton in ocean water before they impact California's valuable shellfish resources or become a threat to consumer safety.

For More Information Please Call:
(510) 540 - 3423

For Recorded Biotoxin Information Call:
(800) 553 - 4133

Distribution of Toxin-Producing Phytoplankton Northern California



Northern California Summary:

Alexandrium catenella (Dinoflagellate that produces paralytic shellfish poisoning (PSP) toxins). *Alexandrium* increased in relative abundance and distribution in September compared to August's observations. This dinoflagellate was observed along most of the northern California coast between Monterey and Mendocino counties. The highest relative abundances were observed in the Drakes Bay region of the Marin coast and were associated with elevated levels of PSP toxins in this area.

Pseudo-nitzschia species (includes all known potential domoic acid producing diatoms). *Pseudo-nitzschia* numbers remained high from the southern extent of Monterey County through Sonoma County. High relative abundances were observed along the Monterey coast, including Monterey Bay, offshore of Santa Cruz, inside Santa Cruz Harbor, and inside Bodega Harbor.

The Phytoplankton Monitoring Program, managed by the California Department of Health Services, is a state-wide program designed to detect toxin producing species of phytoplankton in ocean water before they impact California's valuable shellfish resources or become a threat to consumer safety.

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(510) 540 - 3423

For Recorded Biotoxin Information Call:
(800) 553 - 4133

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2151 Berkeley Way, Berkeley CA 94704-1011

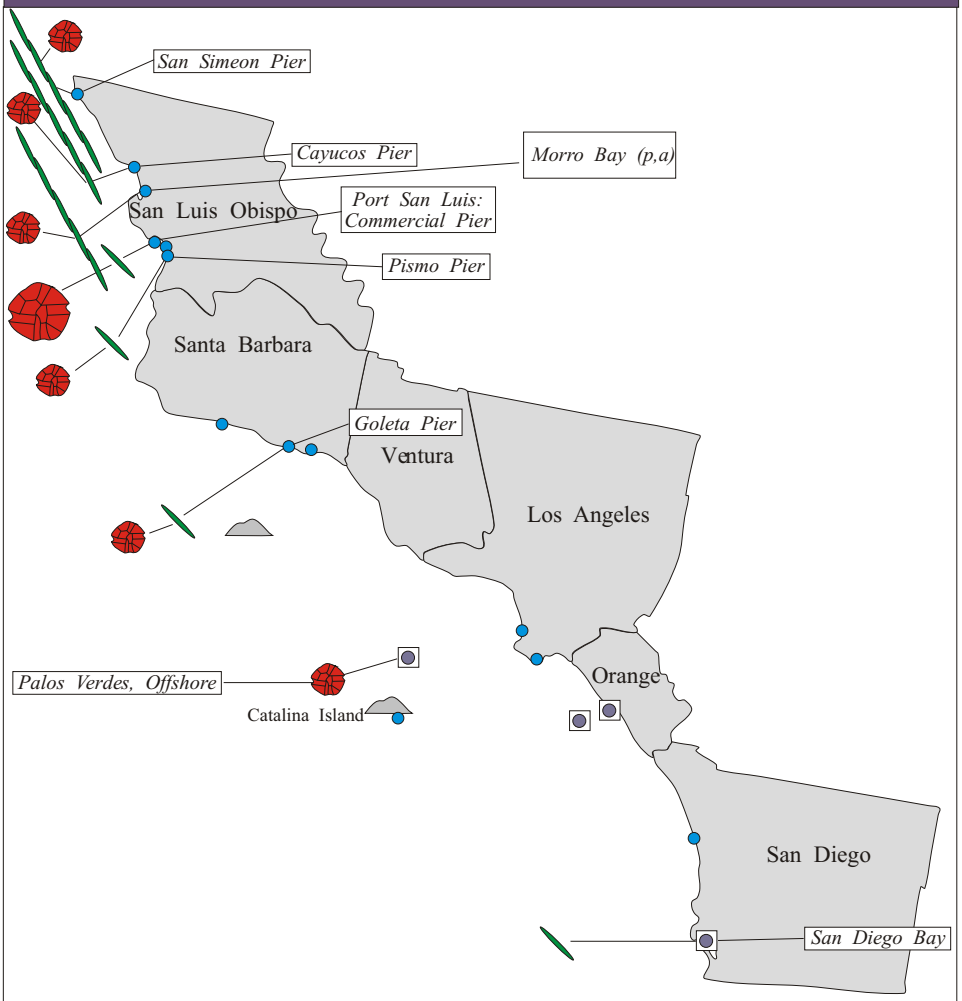
ENVIRONMENTAL MANAGEMENT BRANCH
Phytoplankton Monitoring Program

Phytoplankton Monthly Report

October 2001

Technical Report No. 01-29

Distribution of Toxin-Producing Phytoplankton
Southern California



Relative Abundance of Known Toxin Producers

Alexandrium Species

- Rare (less than 1%)
- Present (between 1% and 10%)
- Common (between 10% and 50%)
- Abundant (greater than 50%)

Pseudo-nitzschia Species

- Present (less than 10%)
- Common (between 10% and 50%)
- Abundant (greater than 50%)

MONTHLY SAMPLING STATIONS:

- Single Sampling Station
- Multiple Sampling Stations
- Offshore Sampling Station

For areas with multiple sampling stations, species abundance at each station is represented as follows:
(a,p) = Abundance for Alexandrium and Pseudo-nitzschia.
e.g., (c,p) = common, present; (a,-) = abundant, not observed

Southern California Summary:

Alexandrium catenella (Dinoflagellate that produces paralytic shellfish poisoning (PSP) toxins). *Alexandrium* decreased in relative abundance along the San Luis Obispo coast in October compared to September's observations. Cell densities were also lower in October.

Alexandrium was also present at Goleta Pier (Santa Barbara County) and offshore of the Palos Verdes peninsula (Los Angeles County), although cell numbers were low.

Pseudo-nitzschia species (includes all known potential domoic acid producing diatoms). *Pseudo-nitzschia* numbers remained high along the San Luis Obispo coast but decreased in relative abundance inside Morro Bay and farther south at Pismo Pier. This diatom was very rare or absent in samples collected farther south (Santa Barbara to San Diego counties).

The Phytoplankton Monitoring Program, managed by the California Department of Health Services, is a state-wide program designed to detect toxin producing species of phytoplankton in ocean water before they impact California's valuable shellfish resources or become a threat to consumer safety.

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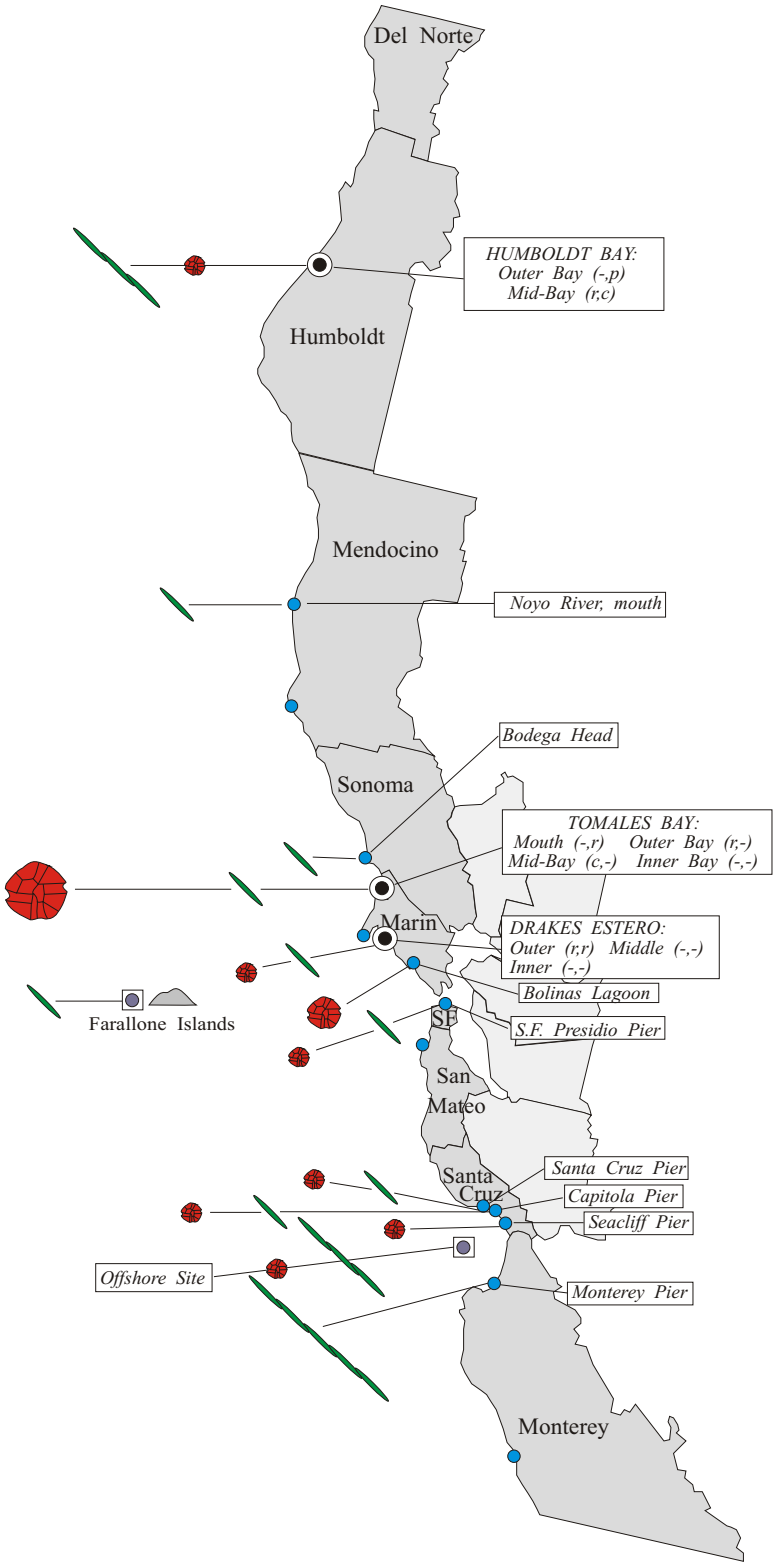
(800) 553 - 4133

Distribution of Toxin-Producing Phytoplankton Northern California



Northern California Summary:

Alexandrium catenella (Dinoflagellate that produces paralytic shellfish poisoning (PSP) toxins). *Alexandrium* decreased in relative abundance and distribution in October compared to September's observations. This dinoflagellate was observed at several sites along the northern California coast between Santa Cruz and Marin counties, as well as inside Humboldt Bay. The highest relative abundances were observed inside Tomales Bay (Marin County).

Pseudo-nitzschia species (includes all known potential domoic acid producing diatoms). *Pseudo-nitzschia* numbers remained high at the Monterey pier but declined at most other sampling locations.

The Phytoplankton Monitoring Program, managed by the California Department of Health Services, is a state-wide program designed to detect toxin producing species of phytoplankton in ocean water before they impact California's valuable shellfish resources or become a threat to consumer safety.

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(510) 540 - 3423

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(800) 553 - 4133

CALIFORNIA DEPARTMENT OF HEALTH SERVICES
2151 Berkeley Way, Berkeley CA 94704-1011

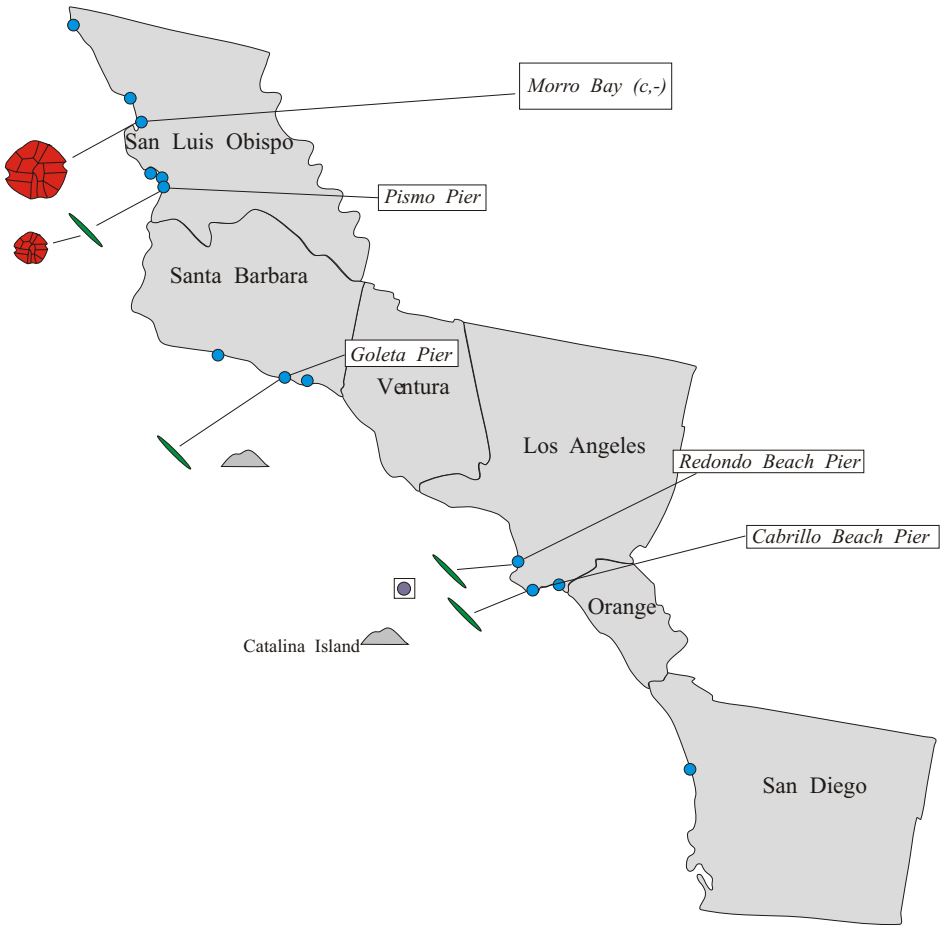
ENVIRONMENTAL MANAGEMENT BRANCH
Phytoplankton Monitoring Program

Phytoplankton Monthly Report

November 2001

Technical Report No. 01-31

Distribution of Toxin-Producing Phytoplankton
Southern California



Relative Abundance of Known Toxin Producers

Alexandrium Species

- Rare (less than 1%)
- Present (between 1% and 10%)
- Common (between 10% and 50%)
- Abundant (greater than 50%)

Pseudo-nitzschia Species

- Present (less than 10%)
- Common (between 10% and 50%)
- Abundant (greater than 50%)

MONTHLY SAMPLING STATIONS:

- Single Sampling Station
- Multiple Sampling Stations
- Offshore Sampling Station

For areas with multiple sampling stations, species abundance at each station is represented as follows:
(a,p) = Abundance for Alexandrium and Pseudo-nitzschia.
e.g., (c,p) = common, present; (a,-) = abundant, not observed

Southern California Summary:

Alexandrium catenella (Dinoflagellate that produces paralytic shellfish poisoning (PSP) toxins). *Alexandrium* decreased significantly in relative abundance along the San Luis Obispo coast in November compared to October's observations. This dinoflagellate was not observed at sampling stations along any other southern California county in November.

Although common inside Morro Bay towards the end of November, the overall number of *Alexandrium* cells observed was low.

Pseudo-nitzschia species (includes all known potential domoic acid producing diatoms). *Pseudo-nitzschia* numbers decreased dramatically along the San Luis Obispo coast by the beginning of November. This diatom was very rare or absent in samples collected farther south (Santa Barbara to San Diego counties).

The Phytoplankton Monitoring Program, managed by the California Department of Health Services, is a state-wide program designed to detect toxin producing species of phytoplankton in ocean water before they impact California's valuable shellfish resources or become a threat to consumer safety.

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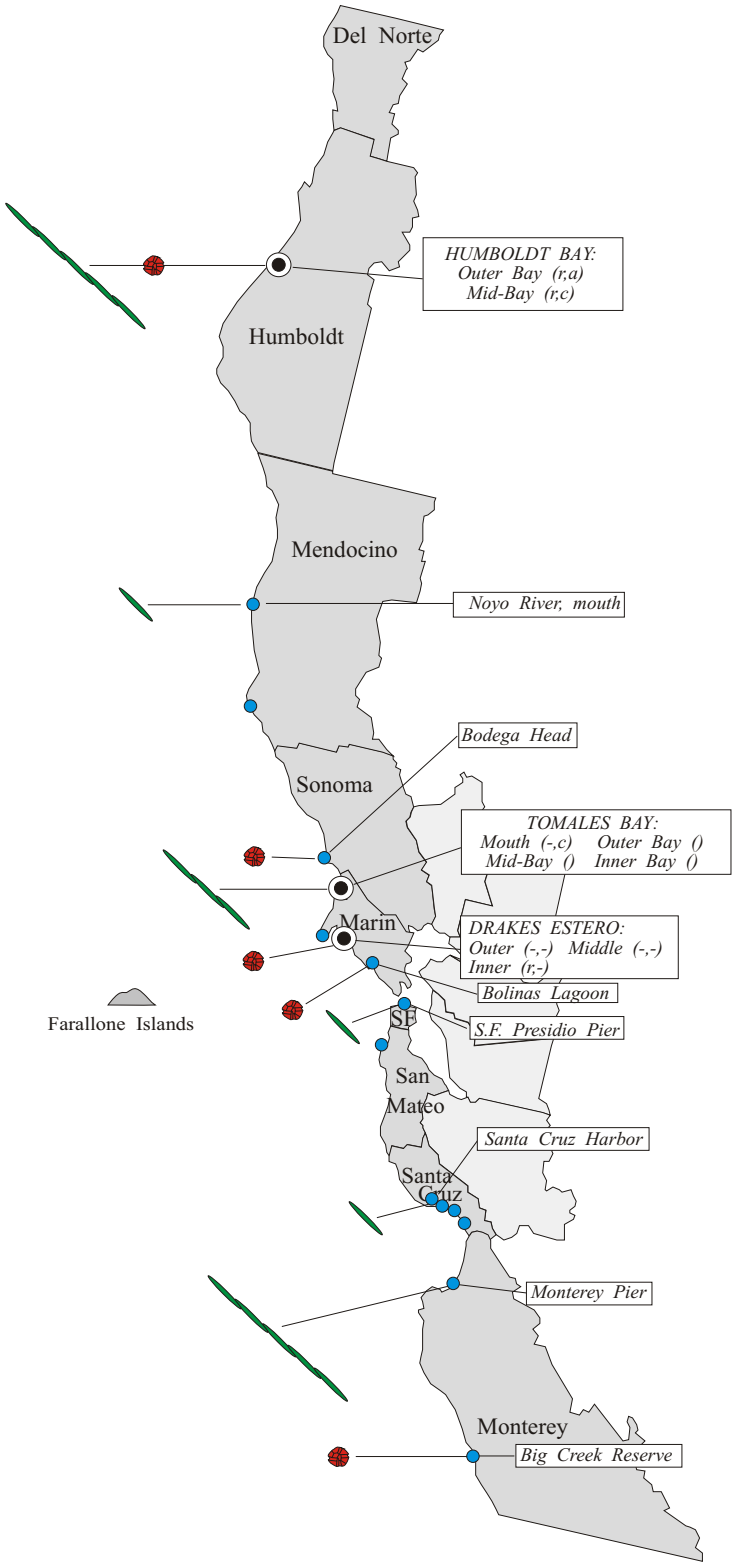
Distribution of Toxin-Producing Phytoplankton Northern California



Northern California Summary:

Alexandrium catenella (Dinoflagellate that produces paralytic shellfish poisoning (PSP) toxins). *Alexandrium* decreased in relative abundance and distribution in November compared to October's observations. This dinoflagellate was observed in low numbers at several sites along the northern California coast. The persistent low numbers of *Alexandrium* inside Humboldt Bay continued to be associated with low levels of PSP toxins in mussels from this area.

Pseudo-nitzschia species (includes all known potential domoic acid producing diatoms). *Pseudo-nitzschia* numbers remained high at the Monterey pier but declined at most other sampling locations. Although abundant in outer Humbold Bay, the overall cell numbers were low and not of immediate concern.

The Phytoplankton Monitoring Program, managed by the California Department of Health Services, is a state-wide program designed to detect toxin producing species of phytoplankton in ocean water before they impact California's valuable shellfish resources or become a threat to consumer safety.

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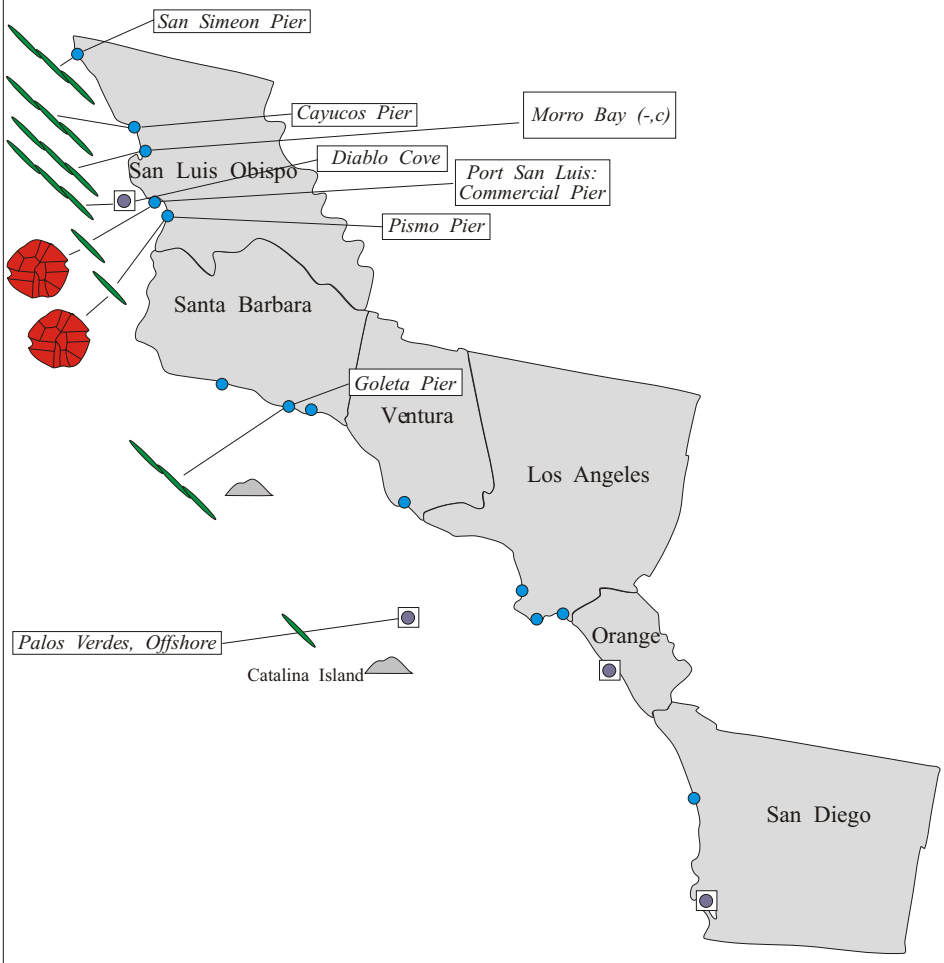
ENVIRONMENTAL MANAGEMENT BRANCH
Phytoplankton Monitoring Program

Phytoplankton Monthly Report

December 2001

Technical Report No. 01-33

Distribution of Toxin-Producing Phytoplankton
Southern California



Relative Abundance of Known Toxin Producers

Alexandrium Species

- Rare (less than 1%)
- Present (between 1% and 10%)
- Common (between 10% and 50%)
- Abundant (greater than 50%)

Pseudo-nitzschia Species

- Present (less than 10%)
- Common (between 10% and 50%)
- Abundant (greater than 50%)

MONTHLY SAMPLING STATIONS:

- Single Sampling Station
- Multiple Sampling Stations
- Offshore Sampling Station

For areas with multiple sampling stations, species abundance at each station is represented as follows:
(a,p) = Abundance for Alexandrium and Pseudo-nitzschia.
e.g., (c,p) = common, present; (a,-) = abundant, not observed

Southern California Summary:

Alexandrium catenella (Dinoflagellate that produces paralytic shellfish poisoning (PSP) toxins). *Alexandrium* increased significantly in relative abundance along the San Luis Obispo coast in December compared to November's observations. This dinoflagellate was common at Port San Luis and southward at Pismo Pier, although cell numbers were low.

Pseudo-nitzschia species (includes all known potential domoic acid producing diatoms). *Pseudo-nitzschia* numbers increased along the San Luis Obispo coast north of Port San Luis and at one site in Santa Barbara by the end of December.

The Phytoplankton Monitoring Program, managed by the California Department of Health Services, is a state-wide program designed to detect toxin producing species of phytoplankton in ocean water before they impact California's valuable shellfish resources or become a threat to consumer safety.

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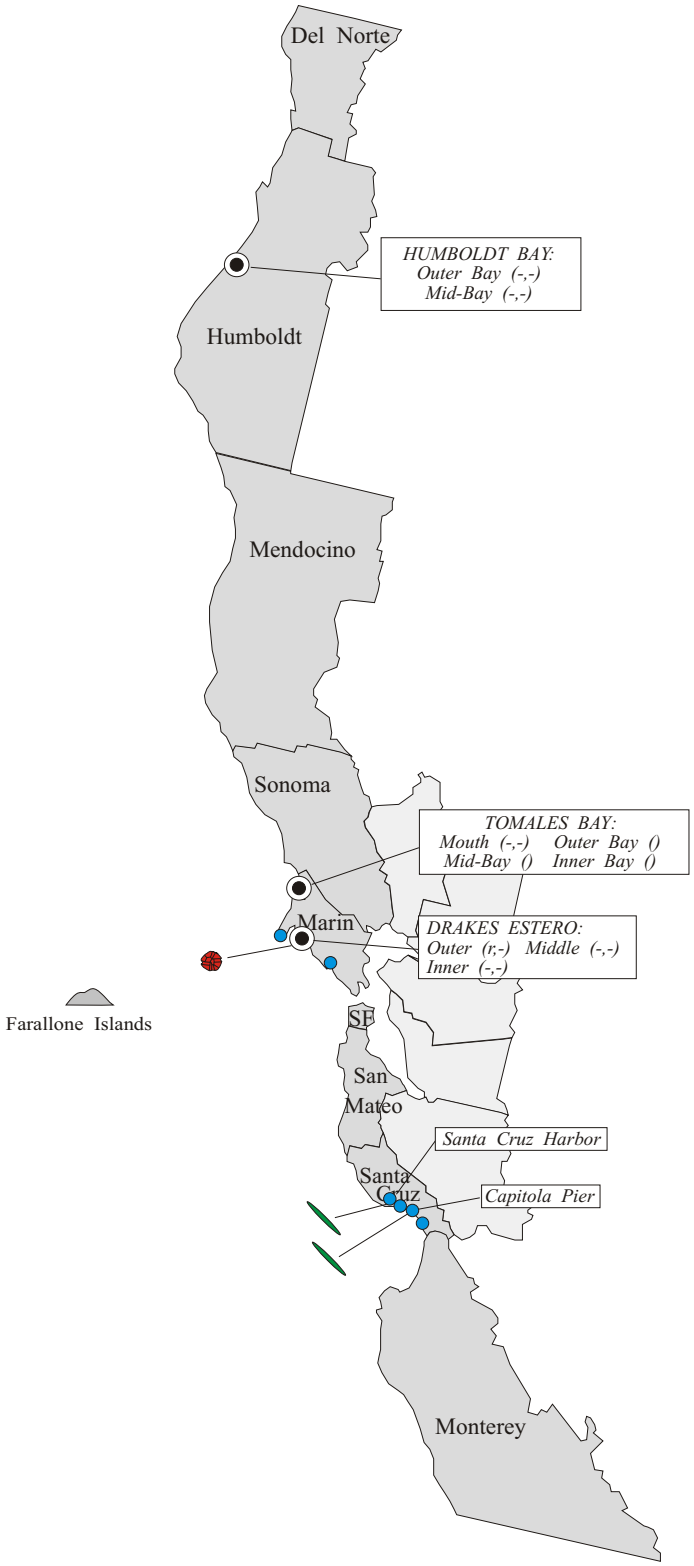
Distribution of Toxin-Producing Phytoplankton Northern California



Northern California Summary:

Alexandrium catenella (Dinoflagellate that produces paralytic shellfish poisoning (PSP) toxins). *Alexandrium* decreased in relative abundance and distribution in December compared to November's observations. This dinoflagellate was only observed in outer Drakes Estero (Marin County) along the northern California coast.

Pseudo-nitzschia species (includes all known potential domoic acid producing diatoms). *Pseudo-nitzschia* was only observed at two sites, both of which were inside Monterey Bay along the Santa Cruz County coastline.

The Phytoplankton Monitoring Program, managed by the California Department of Health Services, is a state-wide program designed to detect toxin producing species of phytoplankton in ocean water before they impact California's valuable shellfish resources or become a threat to consumer safety.

For More Information Please Call:
(510) 540 - 3423

For Recorded Biotoxin Information Call:
(800) 553 - 4133

APPENDIX D.

Monthly lists of agencies and organizations participating in marine phytoplankton sample collection in California during 2001.

Appendix D-1. Agencies and organizations participating in marine phytoplankton sample collection in California during January 2001.

COUNTY	AGENCY	SAMPLES
Del Norte	None Submitted	
Humboldt	Coast Seafood Company	5
	Arcata High School	4
Mendocino	CDHS Volunteer (Amy Johnson)	1
Sonoma	CDHS Volunteer (Cathleen Cannon, Diane Montgomerey)	2
	Bodega Marine Lab	1
Marin	CDHS Volunteer (Brent Anderson, Jackie Bertaina)	5
	California Department of Fish and Game	3
	Johnson Oyster Company	20
Alameda	City of Berkeley, Shorebird Nature Center	2
San Francisco	CDHS Volunteer (Eugenia McNaughton)	2
San Mateo	San Mateo County Environmental Health Department	1
Santa Cruz	None Submitted	
Monterey	CDHS Volunteer (Lisa Marrack)	1
	U.C. Reserve System	1
San Luis Obispo	None Submitted	
Santa Barbara	Vandenberg Air Force Base, Environmental Health Services	2
	U.C. Santa Barbara Marine Sciences	5
	California Department of Parks and Recreation	2
Ventura	California Department of Parks and Recreation	1
Los Angeles	Los Angeles County Sanitation District	4
	Los Angeles County Health Department	3
	Roundhouse Lab and Aquarium	1
Orange	Orange County Sanitation District.	1
	Ecomar, Inc.	1
San Diego	CDHS Volunteers (Paul Sims, Randy and Bill Dick, Kai Schumann, Jeff Kermode)	8
	San Diego County Environmental Health Department	4

Appendix D-2. Agencies and organizations participating in marine phytoplankton sample collection in California during February 2001.

COUNTY	AGENCY	SAMPLES
Del Norte	None Submitted	
Humboldt	Coast Seafood Company	4
	Arcata High School	3
Mendocino	CDHS Volunteer (Amy Johnson)	2
Sonoma	Bodega Marine Lab	2
Marin	CDHS Volunteer (Brent Anderson, Richard Plant, Cal Strobel)	8
	California Department of Fish and Game	3
	Johnson Oyster Company	12
Alameda	City of Berkeley, Shorebird Nature Center	1
San Francisco	CDHS Volunteer (Eugenia McNaughton)	4
	Gulf of the Farallones National Marine Sanctuary	1
San Mateo	San Mateo County Environmental Health Department	1
Santa Cruz	None Submitted	
Monterey	CDHS Volunteer (Lisa Marrack)	1
San Luis Obispo	Tenera Environmental	3
	Williams Shellfish Company	2
	CDHS Volunteer (Renee and Auburn Atkins)	3
Santa Barbara	U.C. Santa Barbara Marine Sciences	6
	California Department of Parks and Recreation	2
	Vandenberg Air Force Base, Environmental Health Services	2
Ventura	California Department of Parks and Recreation	3
Los Angeles	Los Angeles County Sanitation District	3
	Los Angeles County Health Department	2
	Roundhouse Lab and Aquarium	1
Orange	Orange County Sanitation District	5
	Ecomar, Inc.	2
San Diego	CDHS Volunteers (Randy and Bill Dick, Paul Sims, Vicki Ganguli)	4
	San Diego County Environmental Health Department	2

Appendix D-3. Agencies and organizations participating in marine phytoplankton sample collection in California during March 2001.

COUNTY	AGENCY	SAMPLES
Del Norte	None Submitted	
Humboldt	Coast Seafood Company	4
	Arcata High School	3
Mendocino	CDHS Volunteer (Amy Johnson, Kim Swenson, Jim Wesley)	4
Sonoma	Bodega Marine Lab	2
	CDHS Volunteer (Cathleen Cannon, Diane Montgomery)	2
Marin	CDHS Volunteer (Brent Anderson, Richard Plant, Cal Strobel)	11
	CDHS Marine Biotoxin Program	3
	Johnson Oyster Company	12
	California Department of Fish and Game	2
Alameda	None Submitted	
San Francisco	CDHS Volunteer (Eugenia McNaughton, Jackie Bertaina)	4
San Mateo	San Mateo County Environmental Health Department	2
	CDHS Volunteer (Jackie Bertaina)	1
Santa Cruz	Santa Cruz County Environmental Health Department	3
	San Lorenzo Valley High School	1
Monterey	U.C. Reserve System	1
San Luis Obispo	CDHS Volunteer (Renee and Auburn Atkins)	4
Santa Barbara	California Department of Parks and Recreation	1
	U.C. Santa Barbara Marine Sciences	3
	Vandenberg Air Force Base, Environmental Health Services	2
Ventura	California Department of Parks and Recreation	2
Los Angeles	Los Angeles County Environmental Health Department	3
	Los Angeles County Sanitation District	4
	Roundhouse Lab and Aquarium	2
	Catalina Island Marine Institute	2
Orange	Orange County Sanitation District	6
San Diego	CDHS Volunteer (Kai Schumann, Vicki Ganguli)	7
	San Diego County Environmental Health Department	1

Appendix D-4. Agencies and organizations participating in marine phytoplankton sample collection in California during April 2001.

COUNTY	AGENCY	SAMPLES
Del Norte	None Submitted	
Humboldt	Coast Seafood Company	4
	Arcata High School	4
Mendocino	CDHS Volunteer (Amy Johnson, Jim Wesley)	4
Sonoma	CDHS Marine Biotoxin Program	1
	Bodega Marine Lab	2
Marin	CDHS Volunteer (Brent Anderson, Richard Plant, Cal Strobel)	11
	CDHS Marine Biotoxin Program	1
	Johnson Oyster Company	16
Alameda	None Submitted	
San Francisco	CDHS Volunteer (Eugenia McNaughton)	5
San Mateo	San Mateo County Environmental Health Department	1
Santa Cruz	Aptos High School	1
	Santa Cruz County Environmental Health Department	3
Monterey	CDHS Volunteer (Lisa Marrack)	1
San Luis Obispo	CDHS Volunteer (Renee and Auburn Atkins)	3
	CDHS Marine Biotoxin Program	2
	Tenera Environmental	2
Santa Barbara	U.C. Santa Barbara Marine Sciences	4
	California Department of Parks and Recreation	2
Ventura	California Department of Parks and Recreation	1
Los Angeles	Los Angeles County Sanitation District	3
	Catalina Island Marine Institute	4
	Roundhouse Lab and Aquarium	2
Orange	Orange County Sanitation District.	4
	Ecomar, Inc.	2
San Diego	CDHS Volunteers (Randy and Bill Dick, Kai Schumann)	5
	San Diego County Environmental Health Department	3

Appendix D-5. Agencies and organizations participating in marine phytoplankton sample collection in California during May 2001.

COUNTY	AGENCY	SAMPLES
Del Norte	None Submitted	
Humboldt	Coast Seafood Company	4
	Arcata High School	2
Mendocino	CDHS Volunteer (Amy Johnson, Paul Lobell)	3
Sonoma	CDHS Volunteer (Cathleen Cannon)	1
	CDHS Marine Biotoxin Program	1
Marin	CDHS Volunteer (Brent Anderson, Richard Plant, Cal Strobel)	12
	CDHS Marine Biotoxin Program	3
	Johnson Oyster Company	20
Alameda	City of Berkeley, Shorebird Nature Center	2
San Francisco	CDHS Volunteer (Eugenia McNaughton)	3
San Mateo	San Mateo County Environmental Health Department	1
Santa Cruz	Aptos High School	1
	Pacific Cetacean Group	1
	Santa Cruz County Environmental Health Department	4
Monterey	University of California Reserve System	1
San Luis Obispo	CDHS Volunteer (Renee and Auburn Atkins, Bill Schwebel)	3
Santa Barbara	U.C. Santa Barbara Marine Sciences	6
	California Department of Parks and Recreation	1
Ventura	California Department of Parks and Recreation	4
Los Angeles	Los Angeles County Sanitation District	5
	Los Angeles County Health Department	2
	City of Los Angeles Environmental Monitoring Division	3
	Roundhouse Lab and Aquarium	1
Orange	None Submitted	
San Diego	CDHS Volunteers (Kai Schumann, Jeff Kermode, Rachel Woodfield)	5
	San Diego County Environmental Health Department	2

Appendix D-6. Agencies and organizations participating in marine phytoplankton sample collection in California during June 2001.

COUNTY	AGENCY	SAMPLES
Del Norte	None Submitted	
Humboldt	Coast Seafood Company	4
	Arcata High School	3
Mendocino	CDHS Volunteer (Paul Lobell, Kim Swenson, Jim Wesley)	4
Sonoma	Bodega Marine Lab	1
	CDHS Volunteer (Cathleen Cannon)	2
	CDHS Marine Biotoxin Program	1
Marin	CDHS Volunteer (Brent Anderson, Linda Judah, Richard Plant, Cal Strobel)	9
	CDHS Marine Biotoxin Program	3
	Johnson Oyster Company	16
Alameda	City of Berkeley, Shorebird Nature Center	1
San Francisco	CDHS Volunteer (Eugenia McNaughton)	3
San Mateo	San Mateo County Environmental Health Department	1
	CDHS Volunteer (Debbie Volturno)	1
Santa Cruz	Santa Cruz County Environmental Health Department	6
	Pacific Cetacean Group	1
Monterey	U.C. Reserve System	1
	Pacific Cetacean Group	2
San Luis Obispo	CDHS Volunteer (Curt Beebe, Bill Schwebel, Ernie Lowry)	5
	CDHS Marine Biotoxin Program	11
Santa Barbara	California Department of Parks and Recreation	2
	U.C. Santa Barbara Marine Sciences	4
	Vandenberg Air Force Base, Environmental Health Services	2
	CDHS Marine Biotoxin Program	1
Ventura	California Department of Parks and Recreation	3
Los Angeles	Los Angeles County Sanitation District	4
	Roundhouse Lab and Aquarium	1
Orange	Orange County Sanitation District	3
	Ecomar, Inc.	3
San Diego	CDHS Volunteer (Kai Schumann, Jeff Kermode, Rachel Woodfield)	4
	San Diego County Environmental Health Department	3

Appendix D-7. Agencies and organizations participating in marine phytoplankton sample collection in California during July 2001.

COUNTY	AGENCY	SAMPLES
Del Norte	None Submitted	
Humboldt	Coast Seafood Company	5
Mendocino	CDHS Volunteer (Amy Johnson, Jim Wesley)	2
	California Department of Parks and Recreation	1
Sonoma	California Department of Fish and Game	1
	CDHS Volunteer (Cathleen Cannon)	1
Marin	CDHS Volunteer (Brent Anderson, Richard Plant, Cal Strobel, Linda Judah)	17
	CDHS Marine Biotoxin Program	9
	Johnson Oyster Company	24
Alameda	City of Berkeley Shorebird nature Center	2
San Francisco	CDHS Volunteer (Eugenia McNaughton)	4
San Mateo	San Mateo County Environmental Health Department	1
	CDHS Volunteer (Deb Volturno)	1
Santa Cruz	Pacific Cetacean Group	1
	Santa Cruz County Environmental Health Department	1
Monterey	U.C. Reserve System	1
San Luis Obispo	CDHS Volunteer (Renee and Auburn Atkins, Bill Schwebel)	3
	CDHS Marine Biotoxin Program	1
	Morro Bay 4H and U.S. Coast Guard	2
Santa Barbara	U.C. Santa Barbara Marine Sciences	4
	California Department of Parks and Recreation	2
	CDHS Marine Biotoxin Program	6
Ventura	California Department of Parks and Recreation	2
Los Angeles	Los Angeles County Sanitation District	4
	Los Angeles County Health Department	4
	Roundhouse Lab and Aquarium	1
Orange	Orange County Sanitation District.	1
	Ecomar, Inc.	3
	CDHS Volunteers (Jeff Kermode)	1
San Diego	CDHS Volunteers (Kai Schumann, Jeff Kermode, Rachel Woodfield)	5
	San Diego County Environmental Health Department	1

Appendix D-8. Agencies and organizations participating in marine phytoplankton sample collection in California during August 2001.

COUNTY	AGENCY	SAMPLES
Del Norte	None Submitted	
Humboldt	Coast Seafood Company	4
Mendocino	CDHS Volunteer (Jim Wesley)	2
	California Department of Parks and Recreation	1
Sonoma	CDHS Volunteer (Cathleen Cannon, Cal Strobel)	2
	CDHS Marine Biotoxin Program	2
	Bodega Marine Laboratory	2
Marin	CDHS Volunteer (Brent Anderson, Linda Judah, Cal Strobel)	9
	CDHS Marine Biotoxin Program	5
	California Department of Fish and Game	2
	Johnson Oyster Company	16
Alameda	None Submitted	
San Francisco	CDHS Volunteer (Eugenia McNaughton)	6
	Gulf of the Farallones National Marine Sanctuary	1
San Mateo	San Mateo County Environmental Health Department	1
Santa Cruz	San Lorenzo Valley High School High School	2
	Pacific Cetacean Group	1
	Santa Cruz County Environmental Health Department	3
Monterey	University of California Reserve System	1
San Luis Obispo	CDHS Volunteer (Whit and Judy Whitmire, Renee and Auburn Atkins)	6
	Morro Bay National Estuary Program and 4H	2
	CDHS Marine Biotoxin Program	3
Santa Barbara	U.C. Santa Barbara Marine Sciences	5
	California Department of Parks and Recreation	1
Ventura	California Department of Parks and Recreation	1
Los Angeles	Los Angeles County Sanitation District	3
	Los Angeles County Health Department	2
	City of Los Angeles Environmental Monitoring Division	1
Orange	Orange County Sanitation District	1
	Ecomar, Inc.	4
San Diego	San Diego County Environmental Health Department	5

Appendix D-9. Agencies and organizations participating in marine phytoplankton sample collection in California during September 2001.

COUNTY	AGENCY	SAMPLES
Del Norte	None Submitted	
Humboldt	Coast Seafood Company	4
	Arcata High School	1
Mendocino	CDHS Volunteer (Jim Wesley)	2
	California Department of Parks and Recreation	1
Sonoma	CDHS Volunteer (Cathleen Cannon)	1
Marin	CDHS Volunteer (Brent Anderson, Linda Judah)	6
	CDHS Marine Biotoxin Program	6
	Johnson Oyster Company	20
Alameda	None Submitted	
San Francisco	CDHS Volunteer (Eugenia McNaughton, Carol Keiper)	3
San Mateo	San Mateo County Environmental Health Department	1
Santa Cruz	Santa Cruz County Environmental Health Department	3
	San Lorenzo Valley High School	1
	California Department of Parks and Recreation	2
Monterey	CDHS Volunteer (Whit and Judy Whitmire)	9
San Luis Obispo	CDHS Volunteer (Renee and Auburn Atkins, Jim and Nancy Hale, Connie Marangi, Whit and Judy Whitmire)	32
Santa Barbara	California Department of Parks and Recreation	2
	U.C. Santa Barbara Marine Sciences	5
	Santa Barbara City College	2
Ventura	None Submitted	
Los Angeles	Los Angeles County Sanitation District	4
	Los Angeles County Health Department	4
	Catalina Island Marine Institute	1
Orange	Orange County Sanitation District	2
	Ecomar, Inc.	3
San Diego	CDHS Volunteer (Randy and Bill Dick)	1
	San Diego County Environmental Health Department	4

Appendix D-10. Agencies and organizations participating in marine phytoplankton sample collection in California during October 2001.

COUNTY	AGENCY	SAMPLES
Del Norte	None Submitted	
Humboldt	Coast Seafood Company	5
	Arcata High School	3
Mendocino	CDHS Volunteer (Amy Johnson, Jim Wesley)	5
Sonoma	Bodega Marine Lab	1
Marin	CDHS Volunteer (Brent Anderson, Cal Strobel, Linda Judah)	12
	CDHS Marine Biotoxin Program	1
	Johnson Oyster Company	20
	California Department of Fish and Game	2
Alameda	None Submitted	
San Francisco	CDHS Volunteer (Eugenia McNaughton)	6
	Oceanic Society	1
San Mateo	San Mateo County Environmental Health Department	1
Santa Cruz	Santa Cruz County Environmental Health Department	6
Monterey	CDHS Volunteer (Whit and Judy Whitmire)	2
	Pacific Cetacean Group	1
San Luis Obispo	CDHS Volunteer (Judy and Whit Whitmire, Renee and Auburn Atkins, Connie Marangi)	18
	Morro Bay National Estuary Program	1
Santa Barbara	U.C. Santa Barbara Marine Sciences	5
	California Department of Parks and Recreation	3
	Santa Barbara City College	4
Ventura	None Submitted	
Los Angeles	Los Angeles County Sanitation District	3
	Los Angeles County Health Department	2
	Catalina Island Marine Institute	2
Orange	Orange County Sanitation District.	1
San Diego	CDHS Volunteers (Randy and Bill Dick)	1
	San Diego County Environmental Health Department	3

Appendix D-11. Agencies and organizations participating in marine phytoplankton sample collection in California during November 2001.

COUNTY	AGENCY	SAMPLES
Del Norte	None Submitted	
Humboldt	Coast Seafood Company	4
	Arcata High School	4
Mendocino	CDHS Volunteer (Amy Johnson)	1
Sonoma	Bodega Marine Laboratory	1
Marin	CDHS Volunteer (Brent Anderson, Cal Strobel)	4
	CDHS Marine Biotoxin Program	1
	Johnson Oyster Company	16
Alameda	None Submitted	
San Francisco	CDHS Volunteer (Eugenia McNaughton)	2
San Mateo	None Submitted	
Santa Cruz	San Lorenzo Valley High School High School	2
	Santa Cruz County Environmental Health Department	3
Monterey	CDHS Volunteer (Whit and Judy Whitmire)	1
San Luis Obispo	CDHS Volunteer (Whit and Judy Whitmire, Renee and Auburn Atkins)	9
	Tenera Environmental	1
Santa Barbara	U.C. Santa Barbara Marine Sciences	4
	California Department of Parks and Recreation	1
	Santa Barbara City College	4
Ventura	None Submitted	
Los Angeles	Los Angeles County Sanitation District	3
	Los Angeles County Health Department	4
Orange	Ecomar, Inc.	4
San Diego	San Diego County Environmental Health Department	4

Appendix D-12. Agencies and organizations participating in marine phytoplankton sample collection in California during December 2001.

COUNTY	AGENCY	SAMPLES
Del Norte	None Submitted	
Humboldt	Coast Seafood Company	4
	Arcata High School	4
Mendocino	None Submitted	
Sonoma	None Submitted	
Marin	CDHS Volunteer (Brent Anderson, Linda Judah)	3
	Hog Island Oyster Company	1
	Johnson Oyster Company	16
	Cove Mussel Company	1
	Marin Oyster Company	1
	Point Reyes Oyster Company	2
	Tomales Bay Oyster Company	1
Alameda	None Submitted	
San Francisco	CDHS Volunteer (Eugenia McNaughton)	2
San Mateo	None Submitted	
Santa Cruz	Santa Cruz County Environmental Health Department	4
	San Lorenzo Valley High School	1
	Aptos High School	1
Monterey	None Submitted	
San Luis Obispo	CDHS Volunteer (Whit and Judy Whitmire)	7
	Tenera Environmental	3
Santa Barbara	California Department of Parks and Recreation	2
	U.C. Santa Barbara Marine Sciences	4
	Santa Barbara City College	1
Ventura	California Department of Parks and Recreation	1
Los Angeles	Los Angeles County Sanitation District	3
	Los Angeles County Health Department	2
Orange	Orange County Sanitation District	1
	Ecomar, Inc.	1
San Diego	CDHS Volunteer (Randy and Bill Dick)	1
	San Diego County Environmental Health Department	4